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TREXLER LAKE PROJECT, LEHIGH RIVER BASIN, PA. SUPPLEMENT.(U)
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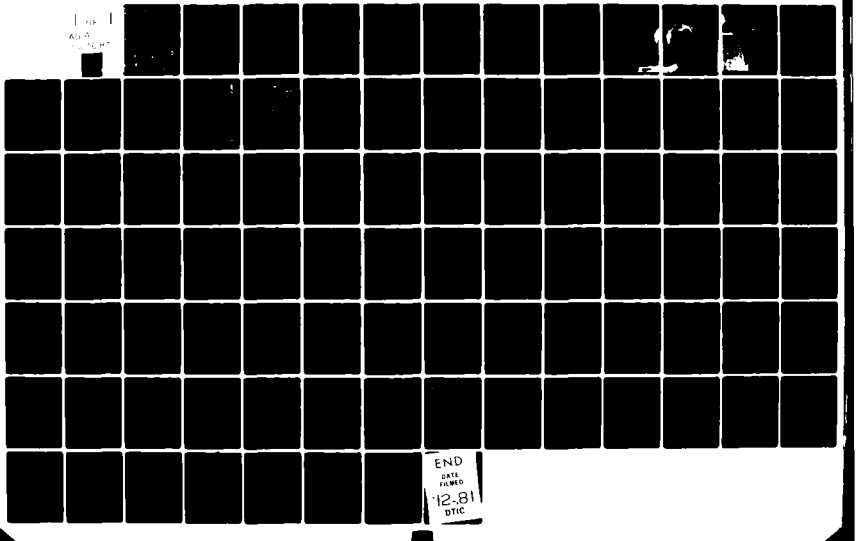

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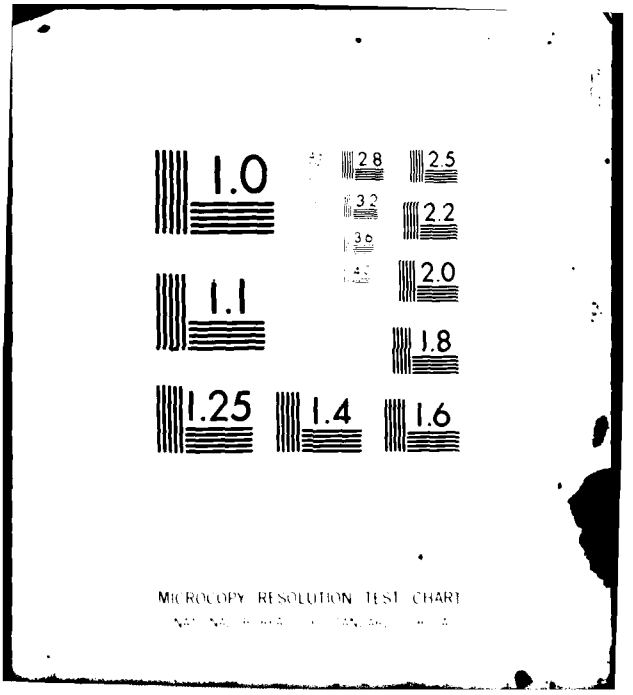
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(1)

LEHIGH RIVER BASIN

JORDAN CREEK, PENNSYLVANIA

LEVEL II

TREXLER LAKE

FINAL SUPPLEMENT TO FINAL ENVIRONMENTAL IMPACT STATEMENT

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

1975

REPT. NO.: DAEN/NAP-18450/EIS-75/01

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3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Supplement to the Final Environmental Impact Statement Trexler Lake Project, Lehigh River Basin, PA - Supplement to Final environmental impact statement.	5. TYPE OF REPORT & PERIOD COVERED: EIS Supplement
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Lehigh River Basin, PA
Environmental Impact Statements
Geology
Flow

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Since the completion of the final EIS, concern was expressed over the Trexler Lake operating program, its low flow releases and their significance to the downstream reaches of Jordan Creek and the ground water table. The intent of this supplement was to add to the final data, indicate flow investigations and re-affirm that the lake will be operated in a manner that will not aggrivate existing conditions.

(Over)

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

The geology of Jordan Creek, water quality, floods, droughts, water supply needs, and land use plans were studied. Maps and charts were included among the data.

SUPPLEMENT

TO THE

FINAL ENVIRONMENTAL IMPACT STATEMENT

TREXLER LAKE PROJECT

LEHIGH RIVER BASIN, PENNSYLVANIA

Foreward

This report supplements the final environmental statement filed with CEQ on 24 August 1973.

Since completion of the final EIS considerable discussion between the Corps, the Federal EPA, the USGS, the Pennsylvania Department of Environmental Resources, DRBC and interested public has taken place. Concern was expressed over the lake operating program, its low flow releases and their significance to the downstream reaches of Jordon Creek and the ground water table. Questions have arisen the specific answers to which are not readily found in the Final Impact Statement.

This Supplement has been prepared to ascertain the answers to these questions. The intent of the present Supplement is to add to past data, indicate the specific flow investigations in progress, and re-affirm that the lake will be operated in a manner which will not aggravate existing conditions. Such operation will at all times reflect the best available and updated hydrological information and co-ordination with all interested agencies and groups.

Specific sections added and changes to existing material are denoted by the numbering of the current entry in the Table of Contents. This numbering corresponds to that in the Final EIS document filed with CEQ on 24 August 1973.

FINAL

SUPPLEMENT

FINAL ENVIRONMENTAL IMPACT STATEMENT

TREXLER LAKE PROJECT

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2. USGS Work Plan: Jordan Creek Flow Studies
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5. Sources of Water Supply for Lehigh County
6. A Pre-Impoundment Water Quality Investigation for Trexler Lake EPA Region III
7. USGS 1972-3 Sampling data for Jordan Creek
8. DRBC Water Supply Agreement, Trexler Lake Project

* Not reproduced herein circulated in the Draft EIS Supplement of 2 Apr 74

FINAL SUPPLEMENT
FINAL ENVIRONMENTAL IMPACT STATEMENT
TREXLER LAKE PROJECT

A. The Geology of Jordan Creek and the Related Water

Loss Problem (2.2.(c))*

Much of Lehigh County drains to the Lehigh River directly and by way of tributary streams. The important tributaries are the Copley, Jordan, Little Lehigh, and Saucon Creeks. Upstream from the gaging station at Allentown some tributaries to the Little Lehigh normally lose much of their flow to subsurface channels and are generally dry. Some of this infiltration recharges ground water basins that do not drain past the gaging station.

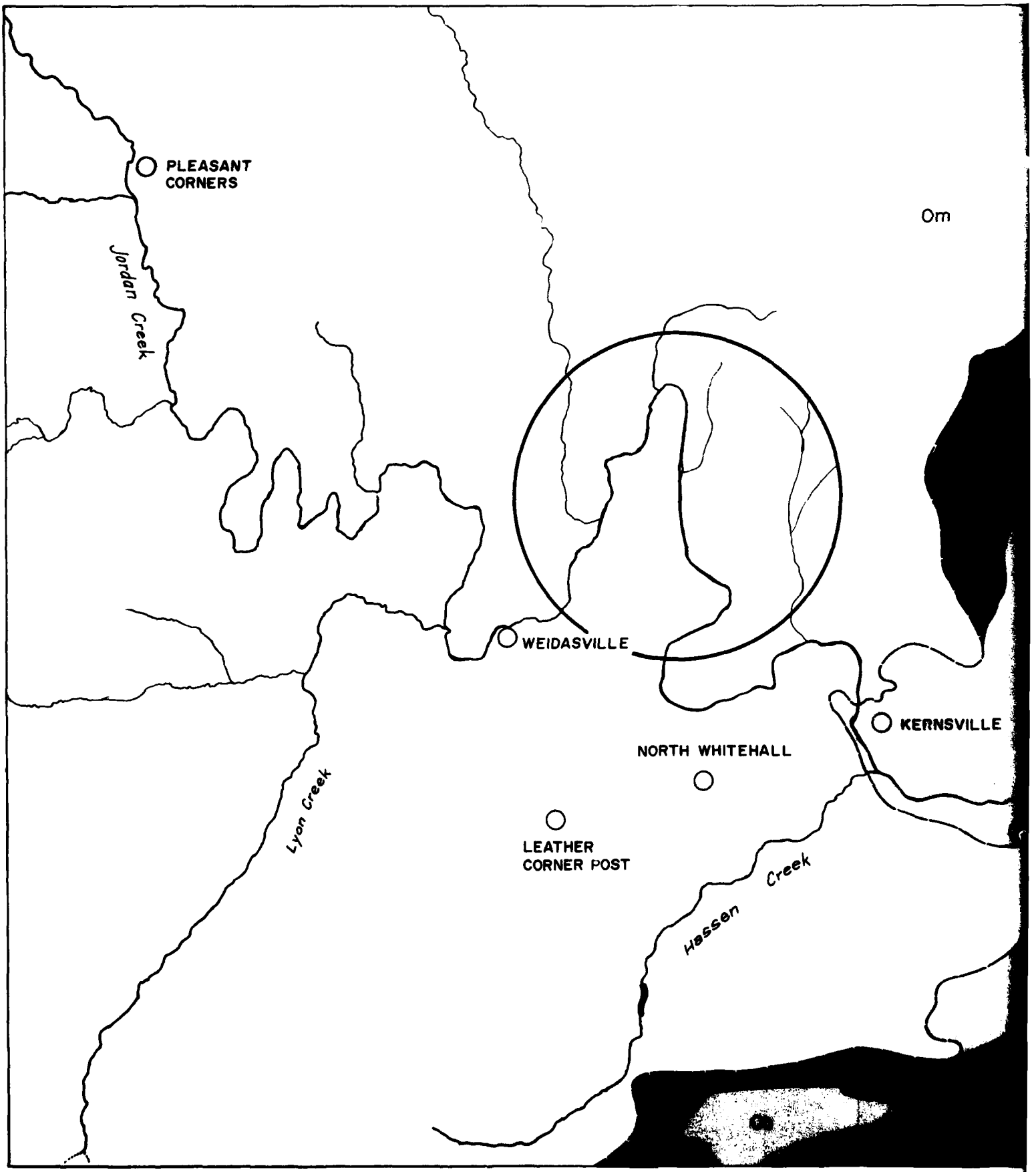
Most of the groundwater out flow which is equivalent to 28 cfs (18.1 mgd) leaves the basin by passing northeastward through the carbonate rocks to the Lehigh River. Underflow in the Martinburg formation is negligible, but water is continually lost from various sections of the channel where it crosses permeable carbonate rocks between Kernsville and Allentown.

Loss of streamflow from the Little Lehigh Creek by channel seepage has been of sufficient magnitude to cause periodic dryness of several miles of channel during the late summer and fall of each year since 1962. The cause of this is unknown but is probably due to increases in permeability in the carbonate rock aquifers underlying the basin.

Although the Jordan Creek basin contains only a few square miles of carbonate rocks, a substantial part of the total out-flow consists of underflow that cannot be directly gaged. Because of these outflows of groundwater, and because of differences in annual evapotranspiration in the various drainage basins, annual water loss (difference between precipitation and run off) ranges between 28.4 inches and 19 inches. For the Jordan Creek at Allentown it is 27.4 inches. This loss represented as a percentage of precipitation is 59.4%. The discharges measured at gaging stations are usually significantly lower than the total outflow from the drainage basin. The Jordan, Little Lehigh, and Monacacy Creeks all have significant amounts of groundwater outflow.

*Numbers in parentheses correspond to the indexing of the Final Environmental Impact Statement on Trexler Lake filed with CEQ on 24 Aug 1973.

JORDAN CREEK DRAINAGE



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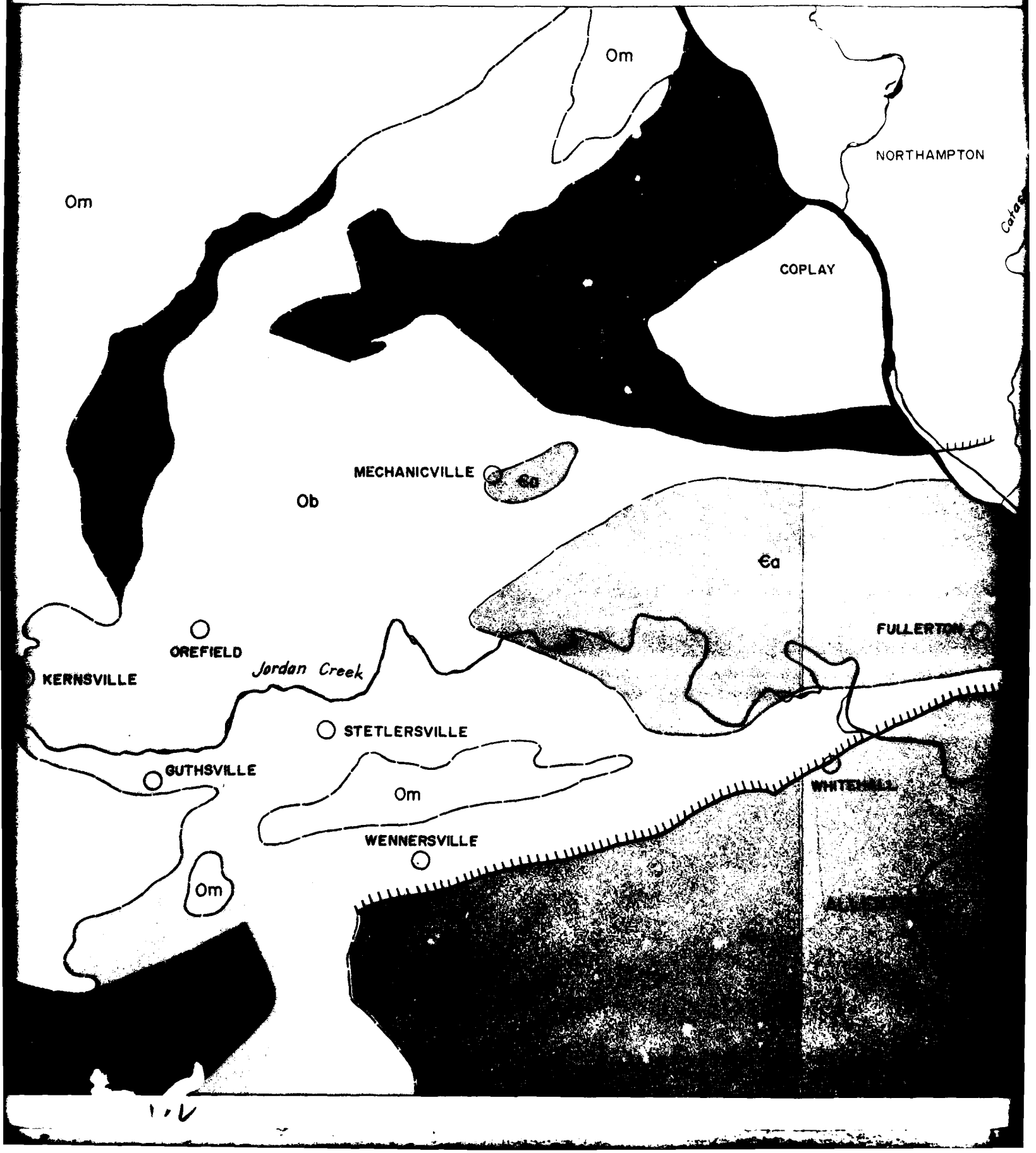

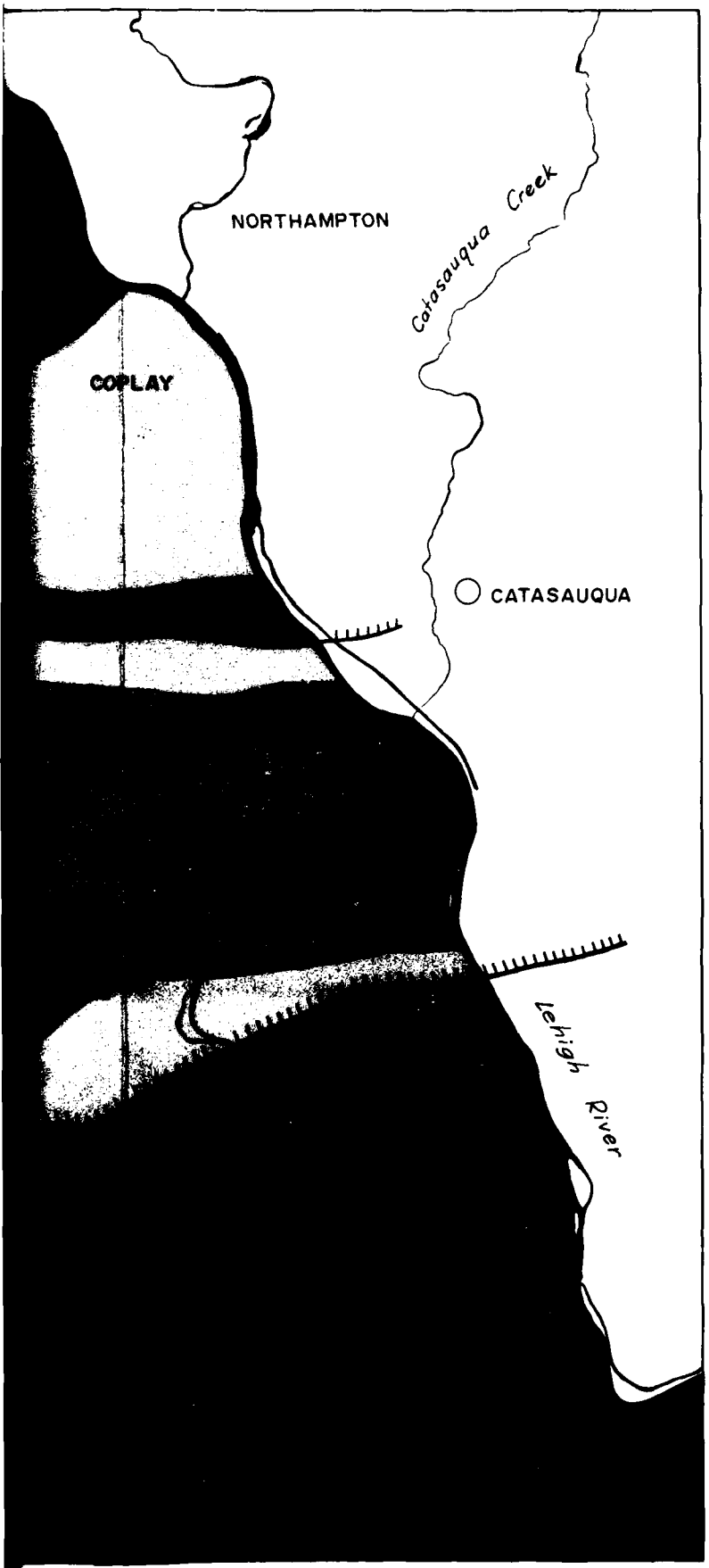

LEGEND

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- JORDAN CREEK AND TRIBUTARIES
- SITE AREA
- FAULT LINE

1 1/2 0 1 MILE

FIGURE S-3

A major portion of the groundwater outflow leaves the Jordan Creek basin by flowing northeast through an underground aquifer system before emptying into the Lehigh River. This water lost through underlain carbonate rock assumes a basic nature and aids in neutralizing the acidic nature of the Lehigh River at the confluence of the aquifer with the river. A USGS report states, "One of the more noticeable features on the water level map is the elongated depression in the water table that extends from Orefield (near Stetlerville gauge) to the Lehigh River. This trough suggests the pressure of large fractures in the carbonate rock aquifer that readily transmit underflow from the Jordan Creek. An average ground water flow of 17 mgd from Jordan Creek Basin is transmitted to the Lehigh River through these fractures".* (Refer also to appendix 3).

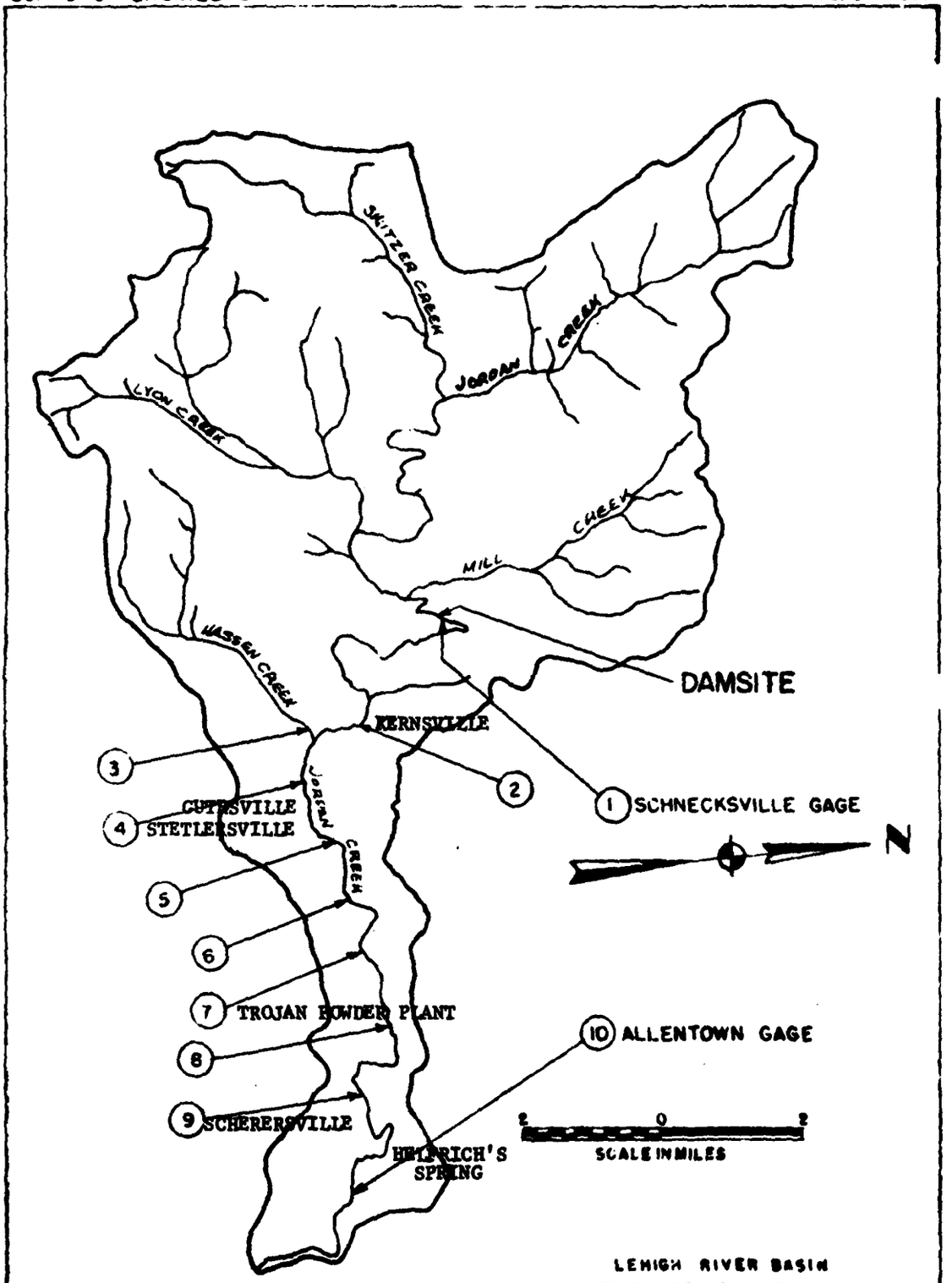
Additional water loss from the Jordan Creek streambed occurs through seepage into the underground water table. Seasonal fluctuations of ground water in carbonate rocks are usually less than 20 feet. However, the 1960-1966 drought period caused groundwater levels to be below normal for several successive years. Conversely, due to the water loss characteristics of Jordan Creek, the groundwater table will rise rapidly in response to an initially high rate of recharge from high runoff. As this recharging of the groundwater table nears completion, the rate of channel loss diminishes. Although channel losses generally increase proportionately with higher stream flows, during prolonged periods of high runoff the net channel losses can become negligible.

In portions of Jordan Creek, as the groundwater level falls below the stream channel, surface runoff seeps into the permeable channel beds at a rate that is sufficient to possibly cause dryness in portions of the main stream channel. Much of this lost stream flow then re-enters Jordan Creek downstream via springs, chiefly in the 4th Street, Helfrich's Spring Area of Allentown. The reach of Jordan Creek from Kernsville to Allentown (Plate 1) can be generally classified into two water losing and two water gaining segments. Streamflow records collected by the USGS show the following general distribution of water gains and losses along the channel.

Kernsville to Guthsville	stream loses water
Guthsville to Stetlersville	stream gains water
Stetlersville to Scherersville	stream loses water
Scherersville to Allentown	stream gains water

The downstream reach of the Jordan Creek streambed consists of deep gravel beds underlain with limestone and dolomite. In dry conditions, the normal saturated condition of the gravel beds does not exist as the water table is lowered into the limestone and dolomite region. Therefore, along certain surface portions that go dry periodically, Jordan Creek has actually assumed the characteristics of an underground stream with water flowing in the underground carbonate-rock region.

* U. S. Geological Survey, Water Resources of Lehigh County, Pennsylvania, Woods, Charles R., Flippo, Herbert N., Lescinsky, Joseph B., p. 240, Harrisburg, PA, 1973.



NOTE: NUMBERS INDICATE STREAMFLOW MEASUREMENT STATIONS

LEHIGH RIVER BASIN
TREXLER RESERVOIR
JORDAN CREEK, PENNSYLVANIA

BASIN MAP OF JORDAN CREEK

Plate 1

This underground flow eventually resurfaces downstream in the Helfrich's Spring area or possible along the Lehigh River.

Supplementing the natural flow of water in Jordan Creek are major discharges from two industrial concerns. Trojan U. S. Power Company (Plate 1) pumps water daily from wells (capacity of 4 MGD) for use in its manufacturing process. The company discharges a daily average of 2.0 MGD of waste water, after treatment, directly into the Jordan Creek. The Lehigh Portland Cement Company owns the Fogelsville Quarry, which is located in the vicinity of Hassen Creek. Until 1971, the quarry was in operation and as a by-product of the mining process, approximately 10 cfs of water was pumped from the quarry directly into Hassen Creek, a tributary of Jordan Creek (Plate 1). During the ordinary quarry operation, a cone of depression in the water table surrounding the excavation is created by the continuous pumping action. In 1971 Lehigh Portland Cement Company discontinued their Fogelsville operation, and the quarry has since filled with water, eliminating the cone of depression. Although there is presently no direct pump-out of water into Hassen Creek, with the filling of the quarry the groundwater table has increased to a level where natural groundwater flow now supplements the flow of water in the adjoining Hassen and Jordan Creeks. This condition was indicated by the presence of a constant flow of water (7-10 MGD) in Hassen Creek during the summer of 1971, even though the direct pump-out from the quarry no longer exists.

During relatively dry summers, especially those preceded by dry springs, Jordan Creek begins to go dry in the Stetlersville area. During periods of prolonged droughts, a potential for water loss may exist over portions of the entire 10.2 mile reach of Jordan Creek from Kernsville to Allentown. When extreme drought conditions are present, a continuous dry length of the streambed can possibly extend along the eight mile reach from Guthsville to Helfrich's Spring.

Normal runoff conditions prevailed in 1967 and 1968 with the return of a sufficient amount of spring and summer precipitation. As a result, Jordan Creek maintained a continuous flow throughout its entire length over this time period. This indicates that when the groundwater supply is sufficiently recharged, Jordan Creek can enjoy an uninterrupted continuous flow. However, due to a continuous loss to the Lehigh River through underground aquifers, there is always a degree of water loss in the Creek. In the normal water-losing regions of Jordan Creek, the flow did reach a minimum of 2 cfs in the late summers of even the normal runoff years of 1968-1969.

In summary, the rate of water loss from various reaches of Jordan Creek is primarily a result of local geological conditions. The existing deep gravel bed of Jordan Creek which is underlain with permeable carbonate rock, in conjunction with the general level and slope of the local water table, are the deciding factors in the extent of water loss. Also, the flow stage of the creek is generally a factor in the amount of water loss, with more water loss occurring at higher flow stages.

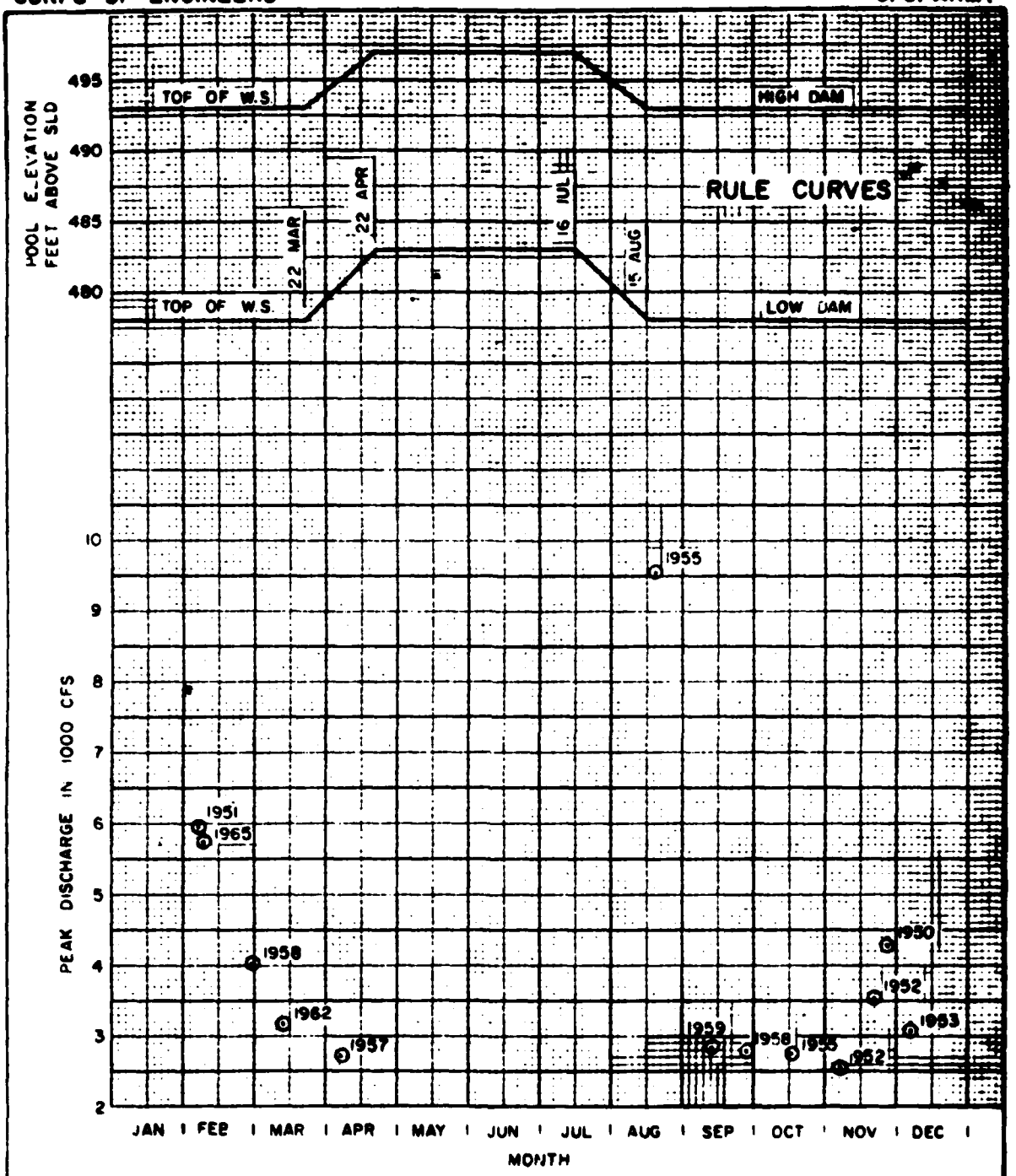
E. Proposed Lake Release Operating Program (1(e)) The drainage area of Jordan Creek upstream from the proposed dam is 52.0 square miles. Water will be impounded in Trexler Reservoir during periods of high runoff to reduce the downstream flood stages. During other flow periods, releases will be regulated in order to maximize the water resource benefits of the lake without hindering downstream flow requirements.

Controlled release rates will vary between 6 cfs during normal flow periods to a maximum of 2000 cfs in periods of flood flow. The safe downstream channel capacity of Jordan Creek is determined to be 2000 cfs.

The operating rule curve (Figure S-2) for the Trexler Lake indicates maintenance of a normal conservation pool elevation of 493 feet m.s.l. until 22 March. For the time period of 22 April through 16 July, the volume of the lake will be increased an additional 4,960 acre feet to elevation 497 feet m.s.l. The summer pool elevation will then be decreased again to 493 feet by 15 August to provide for maximum flood control storage during the primary hurricane season. The principle behind the operating rule curve is that of storing water during the normally high spring runoff period for continued use during the usually dry summer period through August.

Because rainfall and runoff are uncontrollable events, one hundred percent adherence to the operating rule curve cannot be expected. The development of any hydrological model for prediction purposes is based on past data. The reliability of attaining expected pool elevation probabilities presented on a monthly basis (Figure S-1) allows prediction of the percent of occurrence of certain pool elevations. The prediction is to be read as the frequency based on historical data that the actual pool elevation will be equal to or less than the stated elevation. Continuing studies by the USGS and coordination of findings with EPA and other agencies is resulting in corroboration of earlier predictions. (See appendix 1.)

CORPS OF ENGINEERS U. S. ARMY



NOTE.
ONLY FLOODS ABOVE CHANNEL CAPACITY (2500 CFS) ARE PLOTTED FLOWS RECORDED AT ALLENTOWN GAGE 1944 - 1966

LEHIGH RIVER BASIN
TREXLER RESERVOIR
JORDAN CREEK, PENNSYLVANIA

OPERATIONAL RULE CURVES AND ANNUAL DISTRIBUTION OF FLOOD EVENTS ON JORDAN CREEK

Figure S-2

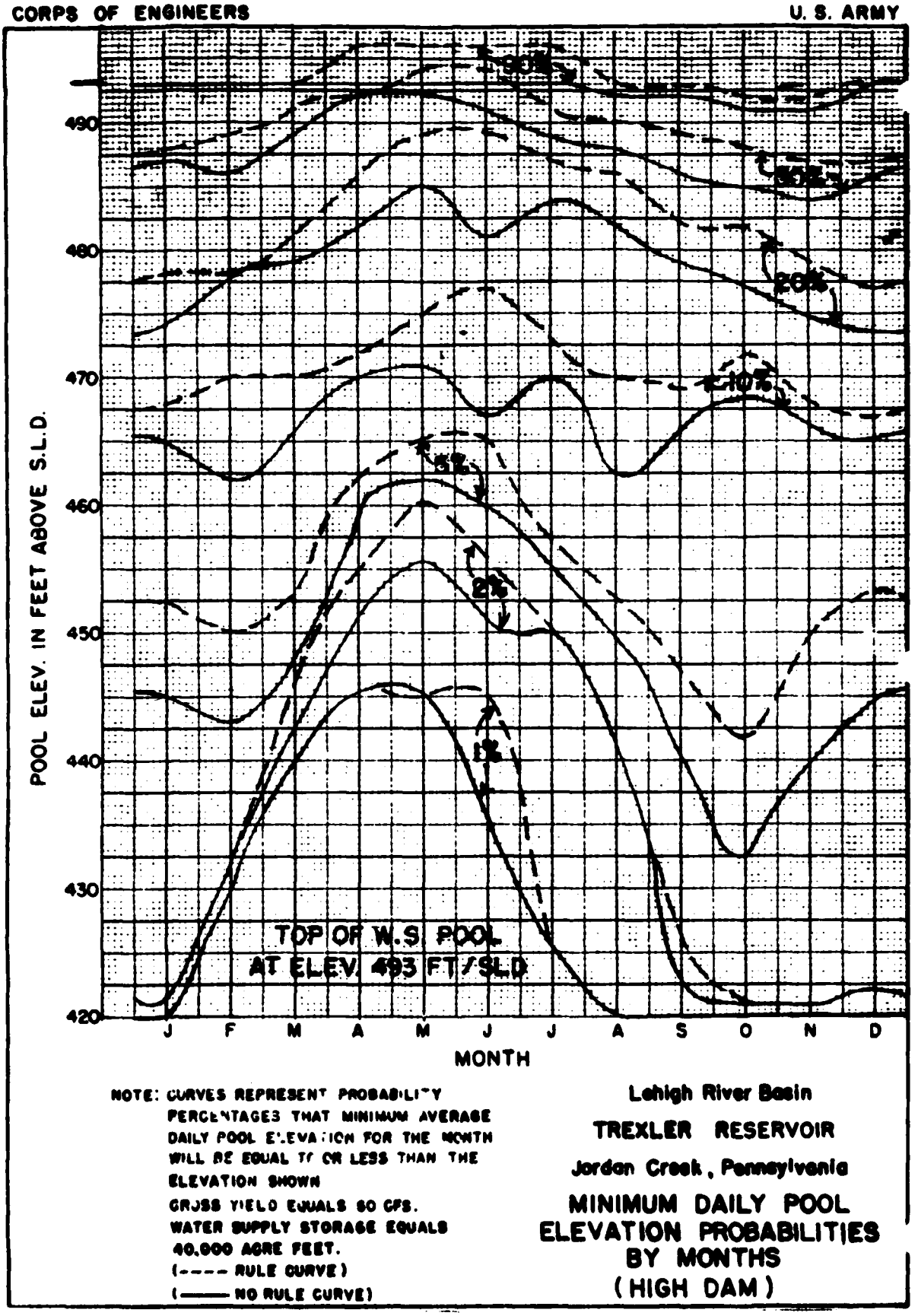

CORPS OF ENGINEERS
U. S. ARMY
POOL ELEV. IN FEET ABOVE S.L.D.
490
480
470
460
450
440
430
420
90%
50%
20%
10%
5%
2%
1%
TOP OF W.S POOL
AT ELEV. 493 FT / SLD
J F M A M J J A S O N D
MONTH
NOTE: CURVES REPRESENT PROBABILITY PERCENTAGES THAT MINIMUM AVERAGE DAILY POOL ELEVATION FOR THE MONTH WILL BE EQUAL TO OR LESS THAN THE ELEVATION SHOWN
GROSS YIELD EQUALS 60 CFS.
WATER SUPPLY STORAGE EQUALS 40,000 ACRE FEET.
(---- RULE CURVE)
(—— NO RULE CURVE)
Lehigh River Basin
TREXLER RESERVOIR
Jordan Creek, Pennsylvania
MINIMUM DAILY POOL ELEVATION PROBABILITIES BY MONTHS
(HIGH DAM)

Figure S-1

C. Water Quality. (2.2.(e)) Since 1968 several water quality sampling programs have been conducted by different Governmental agencies. The results of the studies are in general agreement; however, some conflicting results have been encountered. Generally, the Jordan Creek suffers from organic pollution from agricultural runoff and animal and human wastes. However, there is a marked difference in water quality between the predominately rural areas upstream of the proposed dam site and the more developed, industrialized reaches downstream as the Jordan approaches its confluence with the Lehigh in the city of Allentown, Pa.

Upstream data consists of a pre-impoundment survey conducted by the EPA (Appendix 7) between June and September, 1972 and a long-range data collection program instituted by the Corps in conjunction with the USGS in June of 1972 (Appendix 6). This latter program includes analysis of physical, chemical and bacterial samples on a monthly basis as well as periodically during storm events and will be continued through closure of the dam. In addition to these two recent studies, the USGS conducted upstream tributary sampling in 1968, and the Commonwealth of Pennsylvania performed water quality testing on four occasions in 1971-72. Discharge data (Table 1) for Jordan Creek at Allentown has been recorded by the USGS since 1945.

TABLE 1

ANNUAL PEAK AND AVERAGE DISCHARGES
JORDAN CREEK AT ALLENTOWN
October 1944 to September 1965

Water Year	Month	Day	Peak Discharges (c.f.s.)	Average Discharge c.f.s.	Average Discharge Inches of runoff
1945	Sep	19	1,660	117	20.95
1946	Jun	2	1,340	125	22.31
1947	May	26	2,380	118	21.20
1948	Aug	20	1,680	116	20.68
1949	Dec	31	2,320	92	15.68
1950	Mar	23	1,820	95	16.49
1951	Feb	7	5,940	138	24.68
1952	Nov	7	2,560	196	35.17
1953	Nov	22	3,520	166	29.64
1954	Dec	7	3,070	74	13.24
1955	Aug	19	9,520	111	19.90
1956	Oct	16	2,730	120	21.61
1957	Apr	6	2,710	92	16.46
1958	Feb	28	4,000	115	20.51
1959	Sep	3	1,280	73	13.03
1960	Sep	13	2,820	139	24.96
1961	Feb	26	2,020	101	18.11
1962	Mar	12	3,180	83	14.87
1963	Mar	6	1,750	79	14.12
1964	Jan	25	1,590	80	14.32
1965	Feb	8	5,720	45	8.04
			Average	108	19.33

Downstream of the dam site, the USGS conducted a biological (macroinvertebrate collections and observations of aquatic vegetation) and chemical analysis of Jordan Creek from the approximate location of the dam site downstream to the Fourth Street Bridge, Allentown, Pennsylvania (mile 1.8 of Jordan Creek) during the month of September, 1968.*

This time period is usually characterized by low flow conditions, when point-discharge related pollution would be the most severe. The general conclusion that the stream declines in quality below Stetlersville was confirmed by both the biological and chemical tests.

As a part of the biological analysis, a macroinvertebrate sampling of the bottom material was conducted. By surveying bottom-dwelling macrofauna, a measure as to the extent and severity of existing pollution in the stream can be gauged. The results of the Jordan Creek survey showed that the macroinvertebrate population changes from predominently clear-water forms at Kernsville, to clear water and facultative organisms at Scherersville. This survey, therefore, indicates the degradation of water quality in the downstream reaches of Jordan Creek. In conjunction with the biological survey, aquatic vascular plants and filamentous green algae were observed as predominant features of the biota in the late summer time period of the study. Water milfoil was found at some of the stations; however, it is felt that no problem exists presently or will develop in the near future. Water milfoil may prove to be a nuisance in parts of the lake; the management program for this problem, should it arise, would involve localized spot control.

Dissolved oxygen (DO) and biochemincal oxygen demand (BOD) tests conducted by the USGS indicated that the Jordan Creek changes from a clear classification to a bad classification between Stetlersville and Scherersville. The data collected indicated that water quality in Jordan Creek is highly influenced by man-made wastes. Dissolved oxygen concentrations varied considerably over the reach studied. On September 1968, DO concentrations above Trojan Powder plant were about 7 ppm, a desirable level. However, due to the increased BOD load from the effluent of Trojan Powder Company, an oxygen sag exists downstream from this plant with the DO level decreasing to 3.2 ppm at Scheresville. Another DO sag exists at stream mile 2.0, due to the highly organic effluent of Lehigh Valley Cooperative Dairy. The following tabulation shows DO levels at various points along the Jordan Creek based on samples taken 5 September 1968:

* Miles as measured from the mouth of the Jordan Creek.

Stream Mile*	Time Hrs.	Location Description	Discharge cfs	DO (mg/l)
1.8	12:00 Noon	Fourth St. Bridge	14.3	5.4
2.0	10:30 A.M.	Lehigh Valley Dairy (effluent only)	0.18	6.8
5.5	1:00 P.M.	Scherersville	7.2	3.2
9.4	1:30 P.M.	Trojan Powder Co. (near) Stetlersville	11.0	12.0
12.2	2:15 P.M.	Hassen Cr. at mouth	14.0	10.4
12.8	2:30 P.M.	Kernsville	5.2	7.0
14.0	---- ----	Trexler Dam Site	---	---

An average BOD load of 1.9 mg/l was present above Stetlersville (stream mile 9.4). However, downstream in the more polluted zone of the creek, the BOD reading was as high as 20 mg/l.

The conclusions reached by USGS as a result of their study were that the 6 mile reach of Jordan Creek from Kernsville (stream mile 13.0) to the Trojan Powder Company (stream mile 7.0) has water of good quality; however, at Stetlersville, the creek begins to show signs of degradation caused by the activities of man. The report contends that the lower seven miles of Jordan Creek are polluted to a high degree with the pollution load severely taxing the natural purification process of the stream during low flows. The lower two miles of Jordan Creek are severely polluted, and under low-flow conditions this reach probably cannot support any life other than the most tolerant organisms.

The upstream USGS sampling program which commenced in June of 1972 provides the clearest picture of current conditions. Five locations as shown below have been sampled on a monthly basis, and a summary of data collected between June 1972 and July 1973 is shown in Table 2.

LOCATION OF USGS SAMPLING STATIONS FOR TREXLER LAKE SITE, 1972-73

CoE No.	Station No.	Location
1	01451700	Switzer Creek, 0.5 mile upstream of confluence with Jordan Creek
2	01451695	Jordan Creek, 0.4 mile upstream of Switzer Creek
3	01451770	Mill Creek at Route 309, Diebertsville
4	01451800	Jordan Creek at existing Schnecksville gage site below dam site
5	01451738	Lyon Creek at Route 100, Lyon Valley

TABLE 2

SUMMARY OF USGS MONTHLY DATA COLLECTED BETWEEN JUNE 197[illegible] AND JULY 1973

CoE Station No.		1	2	3	4	5
USGS Station No.		01451700	01451695	014[illegible]770	01451800	01451738
pH	MEAN	7.4	7.3	7.3	7.6	7.4
	RANGE	7.1-7.9	6.8-7.9	6.607.6	6.6-9.2	6.6-8.3
SPECIFIC	MEAN	176	144	205	179	200
CONDUCTANCE µmho	RANGE	140-200	120-160	150-275	140-220	160-295
DO	MEAN	11.2	12.0	11.5	13.6	11.8
mg/l	RANGE	8.6-15.4	9.2-16.8	8.5-16.0	9.2-15.8	8.8-15.2
ALKALINITY	MEAN	34	26	35	30	30
mg/l	RANGE	18-56	18-45	16-56	14-51	16-51
NO_3-N	MEAN	3.1	2.8	3.9	3.4	4.2
mg/l	RANGE	.68-5.6	1.3-5.4	1.8-6.3	1.5-6.1	1.8-6.3
TKN	MEAN	.077	.69	.62	.69	.80
mg/l	RANGE	.23-1.7	.16-1.3	.18-1.3	.20-1.9	.20-1.7
NH_4-N	MEAN	.10	.08	.06	.06	.10
mg/l	RANGE	.01-.30	.01-.35	.01-.15	0-.22	0-.48
ORGANIC N	MEAN	.68	.61	.60	.64	.72
mg/l	RANGE	.06-1.5	.11-1.2	.11-1.2	.15-1.8	.30-1.6
ORTHO P	MEAN	.020	.017	.101	.018	.031
mg/l	RANGE	.006-.068	0-.052	.028-.36	.003-.0	.006-.12
TOTAL P	MEAN	.055	.042	.130	.059	.085
mg/l	RANGE	.013-.28	.010-.19	.031-.36	.012-.39	.014-.49
TOC	MEAN	2.0	4.2	4.2	6.2	4.6
mg/l	RANGE	1.0-9.0	1.5-11.5	2.0-10.0	1.5-34.0	.5-17
TOTAL	MEDIAN	3,000	2,950	1,550	1,100	2,800
COLIFORM /100m/	RANGE	460,15,00	670-14,000	96-1,000	46-14,000	88-20,000
FECAL	MEDIAN	340	330	200	200	700
COLIFORM /100m/	RANGE	49,5,200	33-2800	11-1,200	4-2,400	15-7,000
FECAL /100m/	MEDIAN	280	240	200	200	700
STRERTOCOCCUS	RANGE	39-7,300	88-5,00	46-4,700	16-7,300	130-8,700

The complete set of raw data is in (appendix 6.). Examination of Table 2 reveals that for the most part stream characteristics are quite normal. The notable exceptions are the high concentrations of principal plant nutrients (NO_3-N and Total P) and the high coliform counts for all three forms sampled. It is considered that CoE station number 4 is most representative of the composite influent water quality to the impoundment. At this station, the NO_3-N average of 3.4 mg/l is well in excess of the 0.3 mg/l value commonly accepted as a threshold value capable of supporting nuisance algal blooms. Similarly, the total P value of 0.059 mg/l exceeds the accepted limit of 0.01 mg/l. Thus, the potential for nuisance aquatic plant growths in the form of phytoplankton blooms or rooted macrophytes is present.

Further examination of Table 2 indicates that coliform counts could, if uncorrected, preclude body contact recreation under Pennsylvania state water quality criteria if they persist at present levels after impoundment. The current standard of total coliforms not to exceed 1000 MPN/100 ml is exceeded by the average values at all stations. In addition, the proposed change in the standard to a limit of 200 MPN/100 ml of fecal coliform is also equalled or exceeded by the averages at all stations. Examination of (appendix 6) reveals that the higher coliform densities are generally experienced during the summer months at the peak of the recreation season. In spite of these values however, it is not possible at this point to predict what effect impoundment will have on coliform dieoff rates not to say how implementation of recent legislation (PL 92-500) will affect background coliform densities.

Between June and September 1972, the Region III EPA conducted a pre-impoundment survey at nine sampling locations in the area of the damsite and upstream tributaries. The full report of the investigation is in (Appendix 7). In addition to the physical, chemical, and bacterial sampling for bottom organisms to determine what types of life the present water quality is capable of supporting. The conclusions from that study, presented below, generally compliment the conclusions drawn from analysis of the USGS data collected to date. It should be borne in mind, however, that sampling was accomplished only on seven days, and that the following conclusions are based on limited data collected at a particular time of the year.

1. The Jordan Creek watershed, which is a sub-basin of the Lehigh River, has a drainage area above the dame site of about 52.0 square miles.

2. The waters of the Jordan Creek Basin are classified by Pennsylvania for use as:

(a) water supply for domestic, industrial, live, stock, wildlife and irrigation purposes;

(b) recreational use for warm and cold water fishery and water contact sports;

(c) treated waste assimilation and power.

3. There are two municipal wastewater treatment facilities, both of which have tertiary treatment. One is located at an elementary school, the other at a housing development. Both appear to be maintained and operated properly. The elementary school facility was not sampled because the school was closed and the treatment facility was not in operation.

4. Major and minor nutrient concentrations far exceed the levels generally found to be necessary to stimulate the growth of algae and aquatic weeds thereby accelerating eutrophication within the proposed impoundment.

5. The oxygen balance of the streams investigated is satisfactory.

6. The physical-chemical characteristics provide an environment which is excellent for the propagation of fish and other aquatic life.

7. Bacteriological data show high counts of indicator micro-organisms, indicating the potential presence of disease-causing bacteria, suggesting direct discharges from individual homes to the receiving stream and livestock waste discharges.

8. Biological data indicated extremely good water quality, for aquatic life, within the streams investigated.

9. The summary of all the physical, chemical, biological, and bacteriological information indicates:

(a) The existing water quality does not meet the requirements for water supply or water contact sports.

(b) Impoundment may accelerate eutrophication.

10. If this impoundment is constructed steps must be taken to eliminate the problems outlined above.

In view of EPA conclusions 9 and 10 above, it is intended to continue USGS data collection activities in order to broaden the data base sufficiently to seek solutions to problems which have been indicated may be present. Earlier sampling programs had also indicated that coliform counts might be unacceptably high. A 1968 sampling program conducted by the Corps of Engineers and the Pennsylvania Department of Environmental Resources Laboratories, Philadelphia, Pennsylvania, concluded that due to a high coliform count, the quality of water in the proposed impoundment would not be suitable for water contract sports. The total coliform counts discovered in this sampling were well in excess of the 1000 MPN per 100 ml. standard of the Commonwealth of Pennsylvania for water bathing purposes. This particular study consisted of six sampling days spaced between 7 February and 20 June. The streams tested were Jordan Creek and its tributaries upstream from the proposed dam site location (12.0 miles from the confluence with the Lehigh River). These coliform tests disclosed that the chief organic pollutant source was generally human waste,

although in some cases the MPN of fecal streptococci was more prevelent indicating an animal waste source of pollution. The reliability of the results of this particular study may have been compromised by the short testing period analyzed (February-June). In addition, the time period encompassed by this particular program is generally characterized by high runoff. Therefore, little low-flow data was used for the derivation of conclusions from the coliform count.

The USGS also conducted chemical tests of the Jordan Creek and its tributaries in 1968. Chemical analysis of water samples from three tributaries (Switzer, Lyon, and Mill Creeks) to Jordan Creek above schnecksville, just downstream of the dam site, and from various ground water wells within the basin are available for use in estimating water quality in the Trexler Reservoir. With moderately high flows in Switzer and Lyon Creeks, the total phosphate concentrations were 0.82 and 1.7 mg/l, respectively. These are considered high and are believed due to the dairy farms in the stream valleys. Phosphate concentrations at Schnecksville are high when surface runoff is high. One sample from Mill Creek during a low flow period had a phosphate concentration of only 0.06 mg/l. Phosphate concentrations at Schnecksville are high when surface runoff is high. Phosphate concentrations in the local ground water are relatively low, with the concentration of 0.1 mg/l exceeded in only one of six wells sampled. Tests conducted by the Commonwealth of Pennsylvania on 23 February 1972 indicate phosphate concentrations ranging from 0.05 ppm to 0.14 at the seven sampling stations observed in the damsite area. Therefore, it appears that phosphate concentrations in the stream and underground water table are relatively low except during periods of high runoff when the area's agricultural naturel adds to a higher phosphate concentration in the surface streams. Several samples from the three tributaries revealed similar concentrations in local ground waters are moderate.

Water quality testing was also done on the upstream reaches of Jordan Creek by both the Commonwealth of Pennsylvania and the Environmental Protection Agency. In two sampling programs (conducted 24 June, 13 July, and 27 July 1971; 23 February 1972) the Pa. DER data confirmed the relatively low BOD load of the seven sampling stations is 1.5 mg/l. The results of the tests also showed lower coliform counts, both total and fecal, generally less than 100 MPN per 100 ml during the 23 February test sample. However, the coliform counts were much higher during the June and July tests, exhibiting values between 50 MPN per 100 ml to 490 MPN per 100 ml. Both sets of data are in direct contrast to the tests conducted in 1968 by the Corps of Engineers and the Commonwealth of Pennsylvania, where coliform counts were generally from 5,000 MPN per 100 ml to 25,000 MPN per 100 ml. The most recent tests by the State now indicate that there is not as much contamination in the upstream reaches of Jordan Creek as was originally believed. The Corps of Engineers is continuing water quality sampling on the upper reaches of Jordan Creek.

In contrast to the higher coliform counts observed upstream of the dam site, the USGS, during its September 1968 downstream survey, found a relatively low coliform density. The total coliform count varied from 16 MPN per 100 ml to 200 MPN per 100 ml. These counts are well within acceptable limits, and in direct conflict with the extremely high coliform counts discovered in the February-June of 1968 water sampling tests conducted by the Corps of Engineers and the Commonwealth of Pennsylvania. A possible reason for this large disparity in counts between the two tests would be that the one test was taken during a comparatively high runoff period (more agricultural and animal waste) while the other test was conducted during a comparatively low runoff period. Some consideration must be given to the different locations where the tests were conducted. The tests that produced high coliform counts were conducted upstream from the area of the USGS tests that indicated low coliform counts. Possibly the non-point sources are upstream from the proposed dam site and lower coliform counts can be expected downstream due to the coliform die-off rates.

In conclusion, studies to date indicate that present water quality in the upstream reaches is generally good and is currently supporting a diversified and healthy community of aquatic organisms. Water quality is progressively degraded downstream due to municipal and industrial discharges. The upper basin area however is subject to a source of nutrient input, probably due to runoff from agricultural lands. In addition, organic pollution is reaching the stream as evidenced by the high coliform densities. The DO and BOD/TOC values indicate however that the current organic loading does not appear to in any way tax the natural assimilative capacity of the stream.

The questions as to what effects, if any, the higher than normal coliform and nutrient concentrations will have on water quality after impoundment is the subject of further study in the form of predictive modeling and continued collection and analysis of data.

Due to industrial wastes and sewage the dissolved oxygen levels downstream from Scherersville are, for the most part, incapable of supporting a diversified fish population during low flow. Jordan Creek was once recognized as one of the principal trout streams in the area. Following the droughts of 1936, 1939, and 1941, when many game fish were lost as the creek dried up, stocking of trout has been restricted to the reach downstream from Helfrichs Spring where there is almost constant flow. In recent years, however, industrial effluents and other wastes entering the lower channel have served to degrade stream quality and thereby reduce the sport fishing potential of the stream. These wastes have also reduced the aesthetic qualities of Jordan Creek which have been naturally diminished by the seasonal cessation of flow in the water losing reach of the channel.

Lehigh River - Jordan Creek Water Quality Comparison. The most recent report available[1] concluded that "the chemical quality of most streams in Lehigh County generally meets U. S. Department of H.E.W. (1962) drinking-water standards." In addition, "with few exceptions, stream waters are suitable for public supply and most industrial uses after conventional treatment." Physical quality and constituents of most Lehigh County streams (notably water temperature and color) are also within acceptable limits for use as a public water supply.

The major differences in the quality of the Jordan Creek and the Lehigh River are in biological quality and a few chemical constituents. For purposes of comparison, the quality of Jordan Creek at the Trexler Dam site, approximately 12 miles above the confluence of the Lehigh and Jordan Creek will be compared the Lehigh River quality from the mouth at Easton up to about River Mile 30 between Northampton and Walmutport, Pennsylvania. This is because Trexler Lake is proposed as a water supply source for the Allentown-Bethlehem area, and any alternative which utilizes the Lehigh River would have to economically feasible, that is it cannot be too far away from the service area.

The exceptions to acceptable chemical quality characteristics noted earlier are principally hardness and manganese concentrations. Hardness is an important consideration in industrial water quality and waters from the lower reaches of Jordan Creek which range in hardness from 150-200 mg/l would require some hardness removal, plus conventional treatment to make them suitable for some industrial processes. In the vicinity of Trexler Lake however, hardness ranges from 50 to 125 mg/l, thus reducing the necessity for removal. Lehigh River water is generally softer than the tributaries due to dilution and drainage from non-carbonate rock areas, and there is little liklihood of the necessity for hardness removal.

The other chemical constituent of concern, manganese, almost always exceeds the recommended PHS standard limit of 0.05 mg/l in the Lehigh River at Allentown but is generally not exceeded in the tributaries including Jordan Creek. Data at Catasauqua, approximately 4 miles upstream of Allentown indicates that manganese often exceeds the PHS Drinking Water Standard. No data for manganese exists upstream of this point , but if manganese concentrations are similar to those at Catasauqua treatment problems may result when ph values fall to their minimum of about 5.3. This problem is further compounded by the fact that the area above River Mile 23 is classed as an acid mine drainage recovery area.[2] Thus during low flow periods, low pH conditions can be expected with a consequent problem in treating for manganese removal.

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[1] "Water Resources of Lehigh County, Pennsylvania," by Wood, Flippo, Lescinsky, and Barker, Pa DER and USGS (1972).
[2] "Lehigh River Biological Investigation," by Pollison and Craighead for the DRBC (1968).

Other Factors Affecting Post-Impoundment Water Quality

Two potential water quality problems are indicated by the data thus far available. As previously mentioned, these problems are (1) the possibility of accelerated eutrophication of the alek due to the present high concentrations of plant nutrients, and (2) the possibility that the high coliform counts may hamper one of the uses of the lake, body contact recreation, (because water quality criteria with respect to this use will be violated.) A third potential problem, not directly related to lake water quality, has also been indicated by available data, namely the question of reservoir release quantites necessary to prevent degradation of the downstream Jordan Creek environment.

It must be pointed out that any conclusions regarding these considerations are presently tentative in light of the sparsity of data thus far collected. In addition to the question of an adequate data base upon which to base firm conclusions, a large number of other factors will have a direct bearing on the future water quality of Trexler Lake as well as the amount of water which must be released from it to provide an acceptable downstream environment.

Perhaps foremost among these other factors is the effect that recent legislation will have on water quality. The goal and intent of these laws (most notably PL 92-500) is to clean up all waters including Jordan Creek. The Pennsylvania Department of Environmental Resources (DER) and the Delaware River Basin Commission can in the future use enforcement measures against polluters. Water quality criteria promulgated by the Pennsylvania DER also reflects the studies being taken toward achievement of this goal. For example, in the case of Trexler Lake, any proposed upstream wastewater treatment plants will be required to institute advanced wastewater treatment technology with 95 percent phosphorous removal by the time the impoundment is constructed.

In general, both the Lehigh and Jordan Creek are degraded by industrial and municipal waste discharges in the Allentown area. Water supply from either of these sources is probably possible but not desirable if other more desirable sources were economically available. Above Allentown, the Lehigh is suitable for water supply subject to the limitation that more than conventional treatment may be necessary and that the river may be subject to slugs of acid particularly during low flow periods. The upper Jordan where Trexler Lake is to be built appears suitable in all respects with conventional treatment being adequate to produce water of the necessary quality for domestic and industrial activites in the area. Although nutrient concentrations from farming activities may produce some enrichment in the lake, it is not expected that this will be severe and in no way will interfere with the use of the lake as a source of water supply.

A final consideration is the presence of mining and metal plating industries in the Allentown area. There appears to be little information on the effects of these activities on water quality, but it can be reasonably inferred that heavy metals are probably entering the streams in the area.

As the water quality date base is expanded, it will be possible to mathematically model Trexler Lake for the purpose of predicting future water quality. The Philadelphia District of the Corps is in possession of a Lake Ecology computer model which has been used to model two other proposed impoundments.

With an adequate data base, which it is anticipated will be provided by the continuing USGS data collection program as well as experience gained in previous applications of the model, valuable insight can be gained into the response of the lake to variations in nutrient loadings alternative outlet works operation procedures and other management techniques. In addition, the model should point out any other potential problems, and after impoundment can be closely calibrated to actual lake conditions and used as a management tool. Current research sponsored by the Corp's Hydrologic Engineering Center aimed at optimizing releases from a multi-level outlet works is expected to further refine the model and make it more usefull as a management tool. A recent report prepared for another impoundment in Philadelphia District * explored a large number of techniques which can be used to manage water quality in an impoundment. In combinations, specific techniques produce management program which would result in ecologically sound control of nuisance aquatic plant growths or other potential problems in the lake. Although the report was prepared for a different impoundment and dealt mainly with aquatic plant contol, the various techniques presented in the report and the manner in which they can be combined to form a management program provide valuable guidance for a similar undertaking at Trexler Lake.

As previously mentioned, the tentative release from Trexler Lake has been set at 6 cfs. This figure based on intensive coordination with EPA, Penna. DER, USGS and DRBC, is designated tentative until the results of a USGS study of the dry bed prc+ion of Jordan Creek downstream of Trexler Lake are reported. In theory, a much large flow could be released from the lake. However, if the flow, no matter how large it is, simply disappears into the ground, then efficient use is not being made of the releases. The Corps intends to prevent degradation of the downstream environment and enhance it where consonant with project purposes. The USGS study currently in progress should provide the Corps with requisite information necessary to achieve this goal. (See appendix 2).

* Tocks Island Lake techniques for Water Quality Management prepared for C of E Philadelphia District by WAPORA, Inc., September 1973.

D. Floods and Droughts (2.3.(e)) Flooding throughout the Lehigh River Basin has resulted from either extra-tropical or tropical storms. Extra-tropical storms include those associated with the passage of a cold front or with a warm front. The majority of basin-wide floods have resulted from the semi-intense rainfall over a long period of time, usually associated with storms caused by a warm front. However, cold front storms, characterized by intense rainfall over a short period of time are usually the cause of flooding along the tributaries of the Lehigh. These tributaries, including the Jordan Creek, are primarily steeply-sloped streams without the channel capacity to handle major amounts of runoff. The Lehigh River Basin has also experienced several basin-wide floods due to hurricane storms. The record-breaking flodds of August 1955 were the result of two hurricanes which passed in the vicinity of the basin within a week. The first saturated the extremely dry ground, while the second produced large runoff quantities.

Flood conditions may be further aggravated by other factors: the depth of the existing snowpack when combined with a high melt rate, ice jamming or by a reduction in the initial and infiltration losses resulting from frozen ground. Although the records indicate that serious flooding along the Lehigh has not been attributed directly to snowmelt, the accumulation of snowfall over the drainage area of the Lehigh River, including the Jordan Creek Basin, combined with spring rains and rapid warming, presents flood threat to the Allentown area. The annual spring snowmelt, combined with a sudden ice-break-up in the Jordan Creek, has resulted in minor flooding in Allentown.

Very little flood stage and discharge information is available for Jordan Creek prior to the installation of the gauge at Allentown in 1944. There have been a number of seriously damaging floods in other sections of the Lehigh River Basin prior to 1944 and probably Jordan Creek exceeded its flood stage during these times. The maximum recorded flood was the result of Hurricane "Agnes" which passed near the basin in late June 1972. The resulting peak stage recorded at the Allentown guage was 8.69 feet with a corresponding discharge of 16,200 cfs. The flood of August 1955 reached a stage of 8.0 feet with a discharge of 9,520 cfs. The flood of May 1942 reached a stage of about 7.1 feet which was established from high-water marks 650 feet downstream of the guage. Table 3 lists the ten highest flows recorded at the Allentown guage.

TABLE 3*
FLOODS OF RECORD AT ALLENTOWN
October 1944 to September 1973

Jordan Creek Gauge

Date	Discharge (cfs)
June 1972	16,200
Aug 1955	9,520
Feb 1951	5,940
Feb 1965	5,720
Nov 1950	4,240
Feb 1958	4,000
Nov 1952	3,520
Sep 1958	3,280
Mar 1962	3,180
Dec 1953	3,070

The established frequency of the June 1972 flood, at the Allentown gauge, is approximately once in 250 years. **

The most susceptible area to flood damage during any major rainfall is the flood plain and the structures constructed on it. The flood plains within the City of Allentown include residential, commercial, and industrial development. Railroads, highways, streets, utility lines, production facilities and a sewage treatment plant would be subject to flooding. The flood plains of Allentown are almost fully developed and future urban expansion is not likely. However, urban expansion has and will probably continue to extend to suburban areas adjacent to Allentown. There are a number of industrial firms located on or near the flood plain of Jordan Creek. Between the Fifth Street and Seventh Street Bridges, the flood plains have been developed into a park. There are three small dams on Jordan Creek within the Park and two more dams upstream of the Seventh Street Bridge. The dams are all of similar construction and are the low-flow type having no storage capacity. A continuous County Park along the banks of the Jordan Creek is presently in the acquisition stage and was discussed in Section 2.2d.

The Delaware River Basin, including the Allentown area, has experience seven extended periods of drought since 1905. The most severe drought occurred from 1960 to 1966, a duration of 68 months. An extended dry period of this length is considered very rare and has been estimated as having a probability of occurence once in 300 years by the USGS. ***

* Table 2-3 in Final EIS
** The discharge frequency for Jordan Creek at the Allentown guage was determined by the methods described in the report entitled: "Statistical Methods in Hydrology," prepared by Mr. L. R. Beard (USA Corps, HEC).
*** Hardison, C. H., "Probability of Allowable Yields in Delaware River Basin," USGS, Washington, D.C.

Prior to the drought of the 1960's, the most severe dry period was 24 months. An extensive discussion of these drought periods is contained in House Document 522, 87th Congress: "Delaware River Basin, New York, New Jersey, Pennsylvania and Delaware." The date of occurrence and duration of each drought period is shown in the following table:

TABLE 4*
PERIODS OF DROUGHT

Year	Period	Length of Drought (months)
1908	Jun-Dec	7
1909	Jul-Dec	6
1914	Feb-Dec	11
1930-31	Jan 30-Dec 31	24
1941-42	Jan 41-Feb 42	14
1957	May-Dec	8
1960-66	Oct 60-May 66	68

Precipitation varies with the seasons. At Allentown normal monthly totals range from 2.64 inches for February to 4.82 inches for July, the wettest month. The drought of 1962-67 was by far the most severe in recent years; deficiencies in annual precipitation ranged from 18.1 percent to 30.1 percent of normal in the 1963-66 period.

The percentage of annual discharge that is base runoff ranges from 60% for the Jordan at Allentown to 90% for Indian Creek near Zionsville. Because of underflow bypassing some gaging stations is substantial. Water budget studies show a mean annual ground water outflow of 4.8 inches for the Jordan Creek basin upstream from the gage at Allentown.

E. Water Supply Needs (2.3(c)) In conjunction with the rapid growth of population and industry in Lehigh County, there is an accompanying need for a greater availability of water. In the mid-sixties, the Lehigh County Commissioners, recognizing the need for additional water sources for the expanding population in Lehigh County, established the Lehigh County Authority for the express purpose of analyzing and securing water supply sources.

The Trexler Reservoir is a major portion of the overall plan of the authority. However, if the Trexler Project were deauthorized, the Lehigh County Authority would have to provide other sources of water to supply the needs of the

* Table 2-4 in Trexler Lake Project Final EIS

of the people and industry in the area. To accomplish this, the authority has drilled and is currently drilling wells in upper Macungie Township and is contemplating a new filtering plant at Allentown. The major water .. sources in Lehigh County, other than Allentown, are drilled wells. Even though the quality, capacity and health safety of private water supplies are not often viewed favorably as public supplies, they are very often used due to economic considerations. Drought periods, possible contamination from underground seepage from septic tanks, and an ever-increasing demand on these wells which could lower the ground water table, are possible dangers that could result in a critical water shortage for both residential and industrial users.

In the Heidelberg, Lowhill and Weisenberg tri-Township area, in which the reservoir and the upstream tributaries are located, there is no public water service. The main source of water is from individual on-lot water supplies, except for the Trout Creek Pond in Heidelberg Township. This pond currently serves the town of Slatington and might be made available for distribution to the tri-Township area.

The water need projections for this area exceed the present supply sources as the Commissioners of Lehigh County, in their letter of 30 June 1969 to the Army Corps of Engineers, stated:

> "The City of Allentown has requested by resolution, an allotment of 15 MGD; the Commissioners of South Whitehall Township have requested 11 MGD; the Supervisors of Upper Macungie Township are including in their request the industrial needs of the new industrial complex indicating a need for a minimum of 10 MGD, increasing to 15 MGD by 1978. It is clearly indicated that at this writing we have a minimum need of 41 MGD from three of the areas involved, which does not give any amount for additional areas."

Lehigh County's new industrial areas also require water. New operations in this area by F. M. Schaefer Corporation Kraft Foods already are projecting water needs upwards of 2 MGD. Their water needs will be supplied on an interim basis by a water system of wells and a reservoir provided, operated and maintained by the private interests involved. With the possible future development of 2,250 acres of unoccupied industrially-zoned land in the area, a further demand will be placed on the water supply sources of the county.

(Appendices 4 and 5) contain amplifying information on ways in which the Lehigh County Authority is considering to meet its future water needs.

F. Effects of the Physical Changes: Project Operation Effects (3.2(c)) Realization of project purposes as made possible by creation and operation of a lake, involves changing the project area from a river type to a lake type environment. Comparison of the quality of the environment of Jordan

Creek with Trexler Lake to the quality of the creek without the lake represents the environmental impact of the project. The effects of the lake creation include environmental changes upstream of the lake. Ground water elevations will be altered in scattered locations of the upstream areas, and the fluctuating lake pool level will produce alternate exposure and inundation of lands in some areas.

Introduction of a large recreation population and operating forces will have a pronounced effect on the area with respect to the liquid and solid wastes generated by those persons, required roads and utilities, and recreation facilities. The resultant land use change should be minor.

The main Architectural scheme of these areas is to blend the facilities in with the natural setting. In conjunction with this plan, all power lines will be blended into the surroundings and will go underground in the recreation areas.

The density of land utilization for recreation will increase. Regional aesthetics are compromised because what was a relatively isolated area will become more intensely used. With the lake, area fishing will be greatly improved over existing conditions, there will be no net quantitative change. The wildlife in the area will be enhanced. Present agriculture and housing will be deleted for land utilization.

However, the current county trend shows a decrease in agricultural employment and a trend towards a more commercialized and industrialized area. This trend may be exploited by commercial developers with, in many cases, scant regard for environmental protection. The planned recreation of the project is compatible with the environment. The elevation of the water table in the vicinity of the project will be raised; generally this is a favorable effect.

Generally project purposes of flood control, water supply, and recreation will be served. Other indirect effects can be attributed to project operations. Project development and visitation will accelerate economic, social and political changes in adjacent communities while the stream's flood plain as protected by the project will undergo a planned change in land use. Zoning of the flood plain downstream of the impoundment is the responsibility of local and county government. The Corps is participating in and otherwise encouraging this aspect of project flood protection. Accelerated population growth in surrounding communities will create a need for more public services (highways, schools, hospitals, utilities, etc.). Scenic, historic, scientific, and cultural artifacts, exist in areas which would otherwise have been lost to private development or enjoyed only for a few private interests, will be preserved and made available to the public. Eight miles of existing stream, the majority of which previously was available only for private use, will also be available to the public for recreational activity. Extensive visitation attracted to the project area and adjacent communities will increase solid and liquid waste loads existing in the area. Minor

increases in noise and air pollution will also result from project development.

Creation of the lake and development of recreation areas will affect wildlife environment and create a need for acquisition of supplemental wildlife lands. Lands within the project area, which otherwise could have been lost to encroaching private development, will be acquired and preserved for wildlife habitat lands. In addition, the lake will affect standing fish crop, fish spawning grounds, and the environment (plant growth and food chain) for resident fish, none of which are anadromous. (Fish species are listed in Table 2-1 of the Final EIS). The nutrient concentrations profile within stream reaches affected by project development will be altered; therefore, the lake and altered stream regimen will affect vegetative cover adjacent to the new lake shoreline. Plant growth may be enhanced within the reservoir area and returned downstream due to change in stream flow nutrient concentration. The lake surface will offer resting areas to migratory birds on the Atlantic Flyway.

A significant consideration in the planning of project operations will be the effects which reservoir releases could have on the downstream environment. As noted earlier, the minimum release from Trexler Lake is at this time tentatively set at 6 cfs. The use of the 6 cfs or a tentative minimum release war approved by the Chief of Engineers and has been developed after extensive co-ordination with EPA, Pa DER, USGS, and the DRBC. This may be compared to the minimum recorded flow of 1.4 cfs. The reason that this release has been designated tentative is that little is known of the geologic structure and ground water hydrology in the dry bed portion. Under CoE sponsorship, this area is presently under detailed observation by the USGS. It is estimated that this evaluation may continue for two or three years before sufficient data is collected to develop updated relationships between flows in the Jordan and the character of the ground water table.* As such relationships can be developed, then the updated information can be established for the Trexler Lake. The Lake will be regulated so as not to worsen the present condition of the ground water table or other downstream attributes.

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As the results of this investigation become known, they will be promulgated to all interested agencies and the public for review and co-ordination. Section J and K elaborate upon co-ordination with others.

G. Analysis of the Environmental Impact Stemming From Physical Changes Caused by the Project -- Creation of a Lake (3.2.(c)).

1. Creation of a Lake Impoundment of waters behind the Trexler Dam will cause the replacement of a gently flowing stream of average one foot depth and 25 foot width with an 8 mile long lake of average 1000 foot width and a depth which varies from 114 feet maximum depth at the dam to 5 feet at the upstream limit of the lake. The lake waters will permanently inundate 1220 acres of land in addition to the 80 acres now covered by the existing stream and, infrequently, would affect an additional 260 acres of land during temporary storage of flood waters.

(a) Eutrophication One of the environmental problems associated with the newly created impoundment will be control of eutrophication. In its natural state, the Jordan is an enriched, flowing creek. When the flow is obstructed by the dam at time of closure the entire ecosystem will be disrupted. After the initial change on the system, a modified ecosystem will develop. The new system within the lake will be characterized by warmer water and reduced flow velocities. In the new lake there will be tendency for the soluble nutrients to be utilized by higher aquatic plants or by algae. These in turn may die, sink to the bottom and contribute to the organic build-up and consequent BOD.

The operation and maintenance features of the water management programs for the lake will consider this natural phenomenon. In particular, regulation of detention time will greatly reduce the reaction time in which the nutrients can express themselves in the form of eutrophication.

Excessive amounts of soluble nutrients (nitrates and phosphates) are a main factor in the eutrophication process. Natural conditions such as temperature and sunlight are also essential. The possible source of the nutrients in the Trexler Lake will be from both natural and created processes. The natural decay of vegetation and animal wastes are the principal natural sources of phosphates and nitrates. Water samples taken in 1968 in coordination with the Pennsylvania Department of Environmental Resources showed high fecal and streptococcal coliform counts. This condition was probably due to improperly treated domestic sewage, livestock manure, and agricultural fertilizer runoff. Major point sources of nutrients have been identified and abated by the Pennsylvania Department of Environmental Resources. Principal sewage outfalls and their volumes along with other pertinent data pertaining to Jordan Creek are outlined in Table 5.

Eutrophication is a natural phenomenon in the life cycle of a lake. The initial eutrophication condition of a newly formed lake usually stabilizes within five years of formation as long as new sources of nutrients are controlled. To inhibit cultural eutrophication, it is recognized that careful control of outfalls in the tributary waters must be performed.

The problem of nutrient source control in the upstream feeder streams of the lake must be coordinated on the private, local, State and Federal levels. Various corrective actions may prove effective at Trexler and

TABLE 5*

SEWAGE OUTFALLS AND THEIR VOLUMES

Source: Department of Environmental Resources, West Reading, Pa.

Name of Plant	Type of Plant	Design Maximum	Average Flow	Type of Treatment	Stream to Which Discharged
1. Heidelberg Hts. Housing Developments	Extensive aeration with microstrainer	59,000 gals/day	29,000 gals/day	Tertiary	Tributary of Mill Creek (above dam)
2. Lehigh County Community College	Extensive aeration with sand filters	63,500 gals/day	36,000 gals/day	Tertiary	Tributary of Jordan Creek (below dam)
3. Parkland Union School District High School	Extensive aeration plant	32,000 gals/day	20,000 gals/day	Secondary	To Jordan Creek (below dam)
4. Northwest Lehigh School District - Weisenberg Elementary School	Extensive aeration with sand filters	33,800 gals/day	30,400 gals/day	Tertiary	Lyon Creek
FUTURE PLANTS PROPOSED					
1. Trexler Game Preserve					Downstream of Dam
2. Mill Creek Acres					Above Impoundment on Mill Creek

Trojan Powder -- Industrial Waste -- 11 lagoons with two aerated
Alpo -- lagoons with chemical treatment
John's Potatoes -- two lagoons -- no discharge
*Table 3-1 in Final EIS

be considered further if eutrophicaion becomes pronounced. These measures include:

(1) Mechanical elimination and removal of excess plant growth.

(2) Aeration of lake water through pressurized air lines along the lake bottom.

(3) Use of holding ponds in the shallow upstream reaches of the lake.

(4) Chemical control.

Although the concept of mechanical elimination and removal of excess aquatic vegetation is the most desirable from an ecological viewpoint, it is costly, highly inefficient and can be used only for larger vegetation with any degree of success and does not address the problem of reducing levels of indigenous primary plant production. Aeration of the lake bottom through pressurized air lines is a very promising technique for preventing nutrient accumulation and reducing BOD: however, it is still experimental and has not been tested in an impoundment as large as Trexler. As for holding ponds, their value for Trexler cannot be assessed since the degree of eutrophication which may occur cannot be determined until the lake is in actual operation.

Chemical control agents that are biodegradable and show low toxicity have been used for aquatic plants with considerable success by the Corps in the past and with minimal environmental disruption. Use of copper sulfate in small quantity has proved effective for algae in the past and has been demonstrated to be non-toxic (in concentrations used) for fish. Studies have demonstrated that fishing yields have not deteriorated in lakes so treated over long periods of time.

(b) Wildlife with the Project Clearly some wildlife habitat will be eliminated. However, the lake will be adjacent to the Trexler Game Preserve, State Game Lands and the wildlife mitigation lands, acquired as part of the project. These areas should provide ample refuge for animals displaced by the lake. The lake will claim 150 acres of existing State gamelands and approximately 200 acres of the Trexler Game Preserve. The Trexler Game Preserve plan a 339 acre expansion of existing facilities and the 548 acres of wildlife mitigation land will be adjacent to the State Game Lands and be homogeneous when the hunting area is considered. No rare or endangered species will be threatened by the project development.

The lake surface should provide for increased waterfowl use. The increased waterfowl use should be guaranteed by more resting grounds, less poaching and other human disturbances as a result of more conservation oriented management.

(c) Fishery Presently the Jordan Creek supports a diversified fish population. In the upper reaches of the creek, the alkaline nature of the

stream supports a high quality warm water fishery. The following is an inventory of the current resident fish population: small and large mouth bass, blue gill, pickerel, sunfish, black-nose dace, darters, white suckers, shiners, pumpkinseed, American eel, and numerour other species. Other than the bass and sunfish potential, there is very little game fishing potential in the upstream reaches of Jordan Creek.

Following improvement, the lake should provide excellent fishing potential. Certain species now present in the creek such as some species of, shiner, dace and pickerel probably will not adapt to the new lake environment. However, species such as bass, alewife, bluegill, pumpkinseed, pike, black crappies, miskellunge, and carp should adapt readily to the warm surface waters of the lake environment.

The Pennsylvania Fish Commission will stock the lake after thorough study of habitat conditions when the impoundment is operational. Stocking in other Corps lakes has included: muskellunge (Esox masquinongy), Walleye (Stizostedion vitreum), and black crappie (Promoxis nigromaculatus), however specific selection of species will result from the post-impoundment studies. A pre-impoundment environmental inventory for Jordan Creek is given in Table 6. The most favorable new habitat for fishes by any major land or water use has been man-made reservoirs. These reservoirs commonly support standing crops of over 200 pounds of fish per acre, and provided a sport catch of over 121,000,000 pounds in 1960.

TABLE 6*

PRE-IMPOUNDMENT ENVIRONMENTAL INVENTORY:# JORDAN CREEK FISHERY

Adaptability	Common Name	Scientific Name
Yes	American Eel	Anguilla rostrata
Yes	Bluegill	Lepomis machrochirus
Yes	Bluntnose Minnor	Pimesphales notatus
Yes	Carp	Cyprinus carpio
Yes	Common Shiner	Notropis cornutus
Yes	Largemouth Bass	Micropterus salmoides
Yes	Pumpkinseed	Lepomis gibbosus
Yes	Redbreast Sunfish	Lepomis auritus
Yes	Redfin Pickerel	Essox americanus americanus
Yes	Smallmouth Bass	Micropterus dolomieui
Yes	Spotfin Shiner	Notropis spilopterus
Yes	Spottail Shiner	Notropis hudsonius
Possibly	Rock Bass	Ambioplites rupestris
No	Blacknose Dace	Rhinichthys atratulus
No	Brown Trout	Salmo trutta
No	Creek Chub	Semotilus atromaculatus
No	Fallfish	Semotilus corporalis
No	Johnny Darter	Etheostoma nigrum
No	Margined Madtom	Noturus insignis
No	Shield Darter	Percina peltata
No	White Sucker	Catostomus commersoni

*Table 3-2 in Final EIS for Trexler Lake Project
#Developed by the Corps based, in part, on authorizing document (H.D. 522) and subsequent letter reports and co-ordination meetings with U. S. Dept. of Interior, Fish and Wildlife Service.

Because of Trexler Lake, the resident fish population will expand rapidly for a period of 6 to 10 years following impoundment. Following this period, the fishery will change from an outstanding fishery, with the major part of the catch being game fish, to a good fishery with game, pan and rough fish all represented in the catch. Seining areas established along the lake shoreline and a lake drawdown program during rough fish spawning periods should effectively control rough fish populations, which would otherwise overpopulate the lake. Consideration will be given to the introduction of northern pike, striped bass, coho salmon, and other predatory species to provide additional sport fishing and to control utilization of alewife, carp and other forage fishes which are likely to become abundant. Provision of boat ramps and parking facilities, fishing piers and fish concentration structures in the lake will increase fisherman use of the resident sport fishery. The resident sport fishery above the lake will not be affected by project development. See appendix II.

(d) Geology and Soils Aquifers in the surrounding valley areas will be enhanced by the lake level and, by the drilling of wells, will provide easier access to plentiful water supplies. The resource potential of the area appears to be minimal. There is no indication of any potential in the project area for coal, natural gas, or oil deposits. The project area does not provide the potential for a commercial quarry. There is an existing fossil area on the banks of the streambed of Jordan Creek in the vicinity of Route 100. The fossil area is at the extreme northern end of the reservoir and would be affected only when the flood control pool is used, or approximately once every ten years. Even during this rare occurrence, only a small portion of the geological area would be affected and the site would in no way be permanently harmed.

(e) Archaelogic and Historic Features Unique features such as areas of historical, archeological, and ecological interest above the normal pool elevation will be preserved in their natural setting. Examples are the covered bridges downstream from the dam and the Indian bake oven located in the Trexler Game Preserve. Rex's and Geiger's covered bridges, both built in 1858, will not be affected by the project. The covered bridge directly downstream from the dam site will also be preserved. The Indian bake oven is located above the flood plain of Jordan Creek downstream from the dam. The state plans to make this unique structure, which is chiseled out of solid rock, a shrine to the Lenni Lenape Indians.

The Pennsylvania Historical and Museum Commission surveyed the area in 1971 and discovered certain structures that were interesting from an architectural standpoint.* The structures sited were two houses and a small cast iron bridge which dates back to 1876.

The funding responsibility for relocation of historical structures lies with local interests involved with historical preservation. The Corps and its real estate activities will cooperate fully towards relocating any historical structure, providing that funding comes from the State or

*June 1971 letter from Pa. Register of Historic Sites and Landmarks (in Final EIS).

authorized Federal source. With regard to the two specific houses mentioned as having architectural merit, the Commonwealth of Pennsylvania will be permitted to bid on the salvage of these structures, provided that the original owners do not wish to exercise their right of salvage retention. The iron bridge specified in the Pennsylvania Historical Survey is being considered for possible use in the recreation area of the park, but has not yet been included in any of the preliminary recreation plans. Before any decision can be made on the use of this iron bridge, justification of the structure's historical significance must be provided. The National Register of Historic Places has been consulted; no entries therein are affected by the Trexler Lake Project.

Comprehensive archeological studies have not been made in the project area since the 1965 Temple University study because private ownership of the land precludes test pitting and surface investigation of the early observations.

Subsequent to the early report the author (Dr. J. Gruber) in November 1965 informally indicated to Dr. John Cotter, Chief of Archaeological Research, Northeast Regional Office, NPS, that there was nothing in the reservoir area to salvage. Further archaeological investigations will be made as project lands become public.

(f) Lake-Water Fluctuation The interaction of natural lake inflows and the lake management program will produce both long-term and short-term water level fluctuations. Analysis of these long-term variations considered scattered mud banks and flats with attendant rooting problems, impeded access to lake waters, and design constraints on water-related recreational facilities. The impact of these features is direct and moderate. Bank and flat areas to be intermittently exposed have been identified for sanding to promote rapid draining of in situ soils. It should be emphasized that drawdowns at other reservoirs (refer to Table 1-2 of the Final EIS) far exceed the fluctuation to be found within Trexler Lake. Experience also indicates that fluctuating waters will not impede access to the water or detract from recreation use significantly. Supporting facilities in the land/water zone include design provisions (size, layout, and adaptability) to accomodate water level fluctuations.

In the course of an average year's operating cycle, the average drawdown will total 7-1/2 feet. The most critical time period for the effect of drawdown is the summer season when aesthetic and ecological considerations are of prime importance. During the June through September period, the drawdown should average 5-1/2 feet. This drop in the pool level will expose 155 additional acres of bottomland. Although this exposed acreage is generally spread over the 35 miles of the lake shoreline, it is most prevalent in the shallow areas of the upstream reaches of the lake. There is ten percent probability of a drawdown of 23 feet to expose 470 acres of previously inundated bottomland. This is a considerable amount when compared to the normal 1220 acre surface area of the lake. This severe drawdown will expose bottomland chiefly in the tributary areas of the

lake, in some cases, as much as 4500 feet long. Also, generally throughout the reservoir, the width of the lake will be reduced by approximately 1/3 its normal size.

Normal drawdown during the recreation season will be minimal, approximately 3/4 inch per day. Land exposed as a result of lowering of the lake level is generally steep sloped so that drainage will not be a serious problem. In the flatter areas in the upstream reaches of the reservoir, the soil is free-draining. However, some areas will require drainage to prevent secondary ponding which could become breeding places for mosquitoes and other nuisance vectors.

A positive program for mosquito control is anticipated, employing U. S. Public Health Service criteria. Typically, small rivulets can be incorporated into the bank area as required to preclude ponding in such locations. Field studies after impoundment will be conducted to determine which areas will require drainage and other measures to prevent and control mosquito and black fly populations. As an added precaution, during clearing operations, objectionable features such as cesspools, land fill sites, and swamps will be treated in accordance with applicable HEW and Pennsylvania Department of Health Standards to eliminate the breeding areas for disease and nuisance vectors.

A continually updated lake operations program will coordinate the demands on the lake during the life of the project so that considerations of flood control, water supply, recreation, and fish and wildlife can be accommodated.

While not an authorized project purpose, maintenance of flow at all times in the lower reaches of the Jordan Creek will be considered in the plan of operation for the Lake. The Lake will be operated with a view toward mitigation of this currently adverse environmental effect.

2. Establishment of Recreation Area Usage. The summer conservation pool will offer a 40 mile shoreline and will be supplemented by a plan of water-related recreation development which will initially support an estimated 185,000 visitors annually. The recreation facilities can be ultimately expanded to accomodate as many as 424,500 visitors, and public access will be permitted along the entire shoreline.

The maintenance of all landscaping and groundwork in the recreation area will be the responsibility of the State after the initial construction by the Corps. The daily traffic load should be sufficiently handled by the extensive superhighway network which services the area. The usage of arterial roads (U.S. Route 309 and Pa. Route 100), which directly service the project area, is presently from 2000 to 10,000 vehicles per day below design capacity. Therefore, the increased usage of Trexler Lake should not present any major transportation problem.

An appropriate waste control management program is necessay in order to

accommodate the recreational usage anticipated at key locations throughout the project. Project funds will be provided to supply drinking water and adequate, sanitary sewage disposal for visitors to Trexler Lake. There are five comfort stations (water-borne sanitary facilities) and five vault latrines planned. Wastes from the water-borne toilets (Generally located in picnic and boat launching areas) will be piped to a sewage treatment plant which will be built in conjunction with the project. Recreation areas which are serviced by vault-type latrines will have the waste trucked to the treatment plant. The latrines will be constructed so that they can be converted into water-borne facilities at some future date. Also the vault will be concrete lined to prevent any seepage of sewage waste into the groundwater; thus avoiding a possible pollution source. Preliminary plans for the treatment plant anticipate that innovative systems such as land disposal using lagoon-like treatment cells and spray irrigation technology may be effectively employed. This system will be considered in conjunction with a sewage plant with the effluent being discharged below the reservoir. In either situation, the sewage plant effluent will meet all State, Federal and DRBC water quality standards. The plant will be operated by Lehigh County.

H. Adverse Environmental Effects Which Cannot Be Avoided

a. Impoundment The major adverse effect of the lake will be the permanent loss of an 8.6 mile stretch of the free-flowing Jordan Creek and inundation of 1220 acres of adjacent lands, in addition to the 80 acres now covered by existing streams. These streams have largely retained their natural appearance and scenic charm because of limited public use. Creation of Trexler Lake would preclude preservation of Jordan Creek and existing streams in its present natural state. On the other hand, creation of Trexler Lake would provide increased public access and use of semi-natural conditions through appropriate acquisition of streamside lands.

The branch of the lake that will go up the existing Jordan Creek streambed to Pa. Route 100 will inundate a small part of a geological site containing low-grade marine fossils, while the branch that will go up the Mill Creek Streambed will partially flood small portions of an area which includes a stand of arrow-wood.

Impoundment of the river to form a lake will accelerate natural eutropication of the stored waters to an extent which is not now fully known. While the total dissolved solids content of the Jordan Creek is low compared to water stored in most large impoundments, significant quantities of phosphates and nitrates exist because of agricultural runoff and treated sewage effluents upstream of the lake.

There is, at present, only meager basic understanding of eutrophication and interrelated limnological process in lakes and predictions are somewhat uncertain. Future growth in upstream population and visitation to the proposed recreation developments along the lake could, of course, increase the potential rate of eutrophication unless preventive actions are undertaken. One possible adverse effect of eutrophication, should

it occur to a significant extent, is development of excessive blooms of algae in Trexler Lake. These blooms could impair the attractiveness of recreational use of the lake and the lakeside developments and diminish the value of stored waters for municipal and industrial uses. Another possible effect is development of a low dissolved oxygen content, during the summer, in the bottom layer of the lake. This reduction of dissolved oxygen would be caused by decay of algae and other detritus that sink to the bottom. The effects of eutrophication would also deleteriously affect the fishery in proportion to the severity of the condition. To combat eutrophication, a multi-level withdrawal system is planned. This system would cause a mixing of various layers of water, thereby reducing the effects of eutrophication. Working experience with other reservoirs suggests that, even where impoundment conditions appear to be highly favorable for utilization of nutrients such as calcium, potassium, nitrogen and phosphorous by algae, with consequent blooms, the reservoirs do act as a nutrient trap; but with proper management, this condition can be effectively managed. A large proportion of the nutrients are passed through the reservoir without being incorporated into the biomass of the reservoir. Much of the phosphorus on the other hand does appear to be precipitated and absorbed by the bottom muds, but in an insoluble form.

Although variable from reservoir to reservoir, the amount of organic material produced within the impoundment is considerable and either accelerates eutrophication or enters the food chain in significant quantities. The primary factors which may be responsible for induction of eutrophic processes in the lake environment will not necessarily be from upstream enrichment, but rather from primary production.

Although nutrient loading may prove to be a major factor in eutrophication of Trexler Lake, the major operative factor will be massive habitat change, (from relatively rapid stream to stillwater impoundment) which allows for establishment of a large biomass of primary producers of organic material. Due to the present state-of-the-art there is no way to predict the degree of eutrophication at Trexler other than to say, like all lakes, it may be a problem on an intermittent basis.

Heavy reliance on use of copper sulfate and on other algicides to control algal blooms may not be made in accord with existing State practice with a view towards minimizing temporary deleterious ecological effects. Such measures, if employed, would only supplement the preventive management. Multi-level openings in the outlet structure offer the opportunity to control oxygen quantities and impoundment level mixtures for sound water management.

b. Adverse Characteristics Brought on by Creation of Lake

1. Loss of free-flowing stream qualities
2. Reduction in agricultural production
3. Exposure of extensive rock cut at the spillway
4. Accelerate natural eutrophication

5. Hardship related to relocation and acquisition
6. Loss of some wildlife habitat
7. Decrease in tax ratables (temporary)
8. Inundation of sites of botanical interest

c. Operation of the Lake Trexler Lake will be operated to pass a minimum daily flow of 6 cfs throughout the year. The average yearly drawdown will be 7-1/2 feet, although drawdown during the 14 week prime recreation season will average 5-1/2 feet. Larger drawdowns will, of course, occur in drought years.

A five foot reservoir fluctuation from the recreation pool elevation of 493 will occur frequently, thereby exposing areas of barren shoreline throughout the impoundment area. Controlled releases of water will be provided to maintain a stream flow comparable to existing conditions downstream where past history indicates that Jordan Creek has often dried up during low flow periods due to the loss of water to the underground aquifer. The project will also reduce the full effect of natural flushing and cleansing occasioned by seasonal high flows.

The adverse effects of drawdown and fluctuation are primarily aesthetic. The Bureau of Sport Fisheries and Wildlife, in its appraisal of the Trexler Lake Project, concludes that drawdowns occuring during spawning periods could have an adverse impact on fishery resources. However, properly timed drawdowns could serve as one method of controlling rough fish in the lake. Additional studies pertaining to artificial spawning areas for game fish are in progress.

The aesthetic effect is not likely to be substantial, since 80% of the shoreline is steep-sloped with most of the soils along the rest of the lake shore being free draining. Therefore, the exposure of these lands is not expected to produce any substantial area of saturated soils. Minor drainage or other measures will be undertaken to minimize mudflat problems where they may exist. Adverse effects on recreational use are not expected since beach areas and supporting facilities will be designed to accommodate the drawdowns in all but the most extreme drought years. A conspectus of alternate actions that might avoid some adverse environmental effects is shown in Table 7.

TREXLER LAKE PROJECT

CONSPECTUS

EXPLORATION & EVALUATION OF ALTERNATE ACTIONS THAT

MIGHT AVOID SOME OR ALL ADVERSE ENVIRONMENTAL EFFECTS

ADVERSE ENVIRONMENTAL IMPACTS	1. Alternate Multi-Purpose Project	2. No-Action	3. Constant Level Reservoir	4. Development on Tributaries	5. Eliminate Recreation	6. Non-Impounding Structure	7. Non-Structural	8. Dry Reservoir	9. Alternate Water Supply	10. Development of the Lehigh River
Lake Creation										
Lose Free-Flowing Streams	x		x		x					x
Lose Some Lands	X		X	X	X	X	X	X	X	X
Lose Some Spawning Grounds in Tributaries	X		X	X	X					X
Extensive Rock Cut Visual Affront	X		X		X				X	
Inundation of Some Historical and Archaeological Features	X		X		X				X	
Flood Protection Works	X		X	X	X				X	X
Initial Natural Eutrophication	X		X	X	X				X	X
Relocation & Acquisition Hardships	X		X	X	X			X	X	X
Lake Operation										
Drawdown, Plant Rooting & Fish										

		Mutually Exclusive	Overtax Existing Facilities			Impede Stream Access / Poor View		Disperse Environmental Impact		Evaluated as Impracticable
Drawdown, Plant Rooting & Fish Spawning Problems	X			X	X				X	X
Changes in Fishery	X			X	X				X	
Recreation Related										
Traffic Jams	X			X					X	X
Solid Waste	X	X		X				X	X	X
Liquid Waste	X	X		X				X	X	X
Unsatisfied Needs										
Flood Control		✓	✓	*		*	*		*	*
Water Supply		✓	*	*		✓	✓	✓		✓
Recreation		✓	✓	*	✓	✓	✓	✓	✓	*
Other Factors										

Legend
✓ Unsatisfied
* Partially Satisfied

TABLE 7

I. Alternatives to the Proposed Action

5(f) The Role of the Lehigh River (New Section)

Alternatives for meeting the future water supply needs of Lehigh County have been explored in three consulting engineers reports to the Lehigh County Authority in 1964, 1969 and 1970. (Pertinent excerpts are presented in Appendices 4 and 5). The 1969 report concluded that based on an examination of the available potential sources of supply, the logical course of action to follow with regard to meeting the water needs in Lehigh County to the year 2020 appears to be as follows:

(a) Develop Jordan Creek to its fullest extent as a new source of water supply.

(b) Develop additional groundwater supplies to meet the limited needs of communities and areas close to the available groundwater supplies.

(c) Continue to monitor the quality of the Lehigh River; develop it as a source of supply when the water quality and demands of adjacent communities warrant this action.

It is further estimated that the development of the full yield of Trexler Reservoir would meet future water needs beyond the year 1990.

The report lists two major problems associated with immediate development of the Lehigh as a source of water supply. The first of these is the relatively poor water quality. Upstream acid mine drainage, industrial pollution* and treated and untreated sewage disposal make the stream relatively undesirable for water supply purposes. Treatment costs, both for construction of facilities and during operation, would be significantly greater than for a good quality water. Continued efforts to improve the water quality of the Lehigh River could significantly reduce the current quality problem.

A second drawback with regard to the use of the Lehigh River as a source of supply for Lehigh County is that, in comparison with Jordan Creek, this stream is relatively distant from the county areas which are expected to create the major portion of the future water needs. Pipelines and pumping stations to distribute water from the Lehigh River would, therefore, be correspondingly more expensive than for potential sources closer to these demand areas.

Finally, immediate development of the Lehigh as the principal water supply for Lehigh County would probably preclude the construction of Trexler Lake with a consequent foreclosure of the other benefits to be derived from Trexler Lake.

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* including cadmium and chromium salts

5(g) Site alternatives for the authorized project (5(f)) In addition to the information furnished in the final environmental impact statement, added data was developed in the course of the pre-authorization studies.*

The results of these investigations identified the recommended project site as being the least costly to implement of the seven sites which were satisfactory from geological considerations. The present site is in the narrowest part of the valley and thereby diminishes the requirements for embankment works. Potential damsites, upstream of that recommended, would not involve the Mill Creek tributary and would be in a broadened section of the valley. Such alternative sites would involve considerably more real estate acquisition (in fee) of orchard instead of farmlands, and the existing State Game Lands. Other site alternatives would have also necessitated the acquisition (in fee) of Trexler Game Preserve Lands including portions of the zoo area.

J. The Relationship of the Proposed Action to Land-Use Plans. (New Section)

The region surrounding the Trexler Lake project is recognized as one of the most rapidly developing areas of the Commonwealth. In anticipation of orderly progress, surrounding authorities have participated in land use planning reflecting both the needs of that jurisdictional level and coordination with larger scope regional considerations. Development of preliminary land-use plans for the project has recognized the plans of other agencies. Continuing liaison with those agencies is helping to ameliorate problems, avoid overlapping effort and to properly place the project into the regional context. Refer to the list of land-use authorities and documents consulted.

a. The Trexler Game Preserve (Northampton County) has developed preliminary plans to expand the zoo portion of the Preserve as well as the total acerage of the park. Project-zoo coordination has focused on problems resulting from cohabitation on the peninsula, including joint visitor accesses the possibilities of cooperative sanitation and internal visitor and animal ingress and egress, and continuity of Preserve lands including recreational expansion in the flood plain down stream of the project.

b. Lehigh-Northampton Joint Planning Commission has developed studies for future water supply and sewage facilities needs. Furthermore, that agency has identified trends in land-use expansion and recreational demands. The reports indicate that the need for sanitary mains will exist from Allentown to approximately 1 mile downstream of the project before 1980.

* Appendices V & W of House Doc. 522, In particular, pp. V-10, 11 & Table V-6; pp W-35-36 & Table W-13. Development of the project for purposes of Recreation only is detailed at pp W-57 to W-60.

Water supply sources have been identified and quantified on the basis of future needs. The results of all these studies have provided insights into project sanitation engineering, land-use densities related to park visitation, the requirement for regional water supply sources and recreational demands.

c. Commonwealth of Pennsylvania agencies including the Department of Transportation, the Department of Environmental Resources and the Pennsylvania State Planning Board, have projected regional needs in highway construction and renovation, identified trends in area recreational supply and demand and evolved comprehensive land-use plans for future regional development. State laws regarding flood plain zoning and discharges into Commonwealth streams have also been considered in project planning. State Department of Transportation plans and advice have aided road relocation decisions and access road capability projections in project planning.

The responsibility of approval, administration and implementation of local regional land-use plans lies with the jurisdictional non-Federal governmental agency. Zoning regulations, sewer and water distribution systems, comprehensive land-use allocations and inter-agency coordination is required to provide intricately proportioned funding sources for the proposed work at the local level. Each cost-sharing partner is responsible for meeting eligibility requirements for reciept of funds from the next higher governmental source. These requirements include recognition of State and Federal laws regarding restrictions and controls involved in the particular type of work. The Trexler Lake project has been planned to be an integral part of the local and regional plans.

d. Internal compatibility of shared use of the peninsula east of the dam with the zoo portion of the Trexler Game Preserve and the Corps operations complex has been coordinated with the joint Lehigh-Northampton Counties Planning Commission. While the location of the spillway will cause compression of the combined facilities and visiting public, both the zoo expansion plans and siting of Corps facilities account for seperation of visitor entrances, sight limitation between functions and possible coordination of joint sanitation system use. Excessively costly alternatives would include relocation of the spillway or a service bridge over the spillway to provide access for relocated operational facilities. Present operational facility sites and accesses accept reasonable terrain cuts which will be enhanced with landscaping.

LIST OF LAND-USE AUTHORITIES AND DOCUMENTS CONSULTED

Preliminary Master Plan, Trexler-Lehigh County Game Preserve, McFadzen, Everly & Assoc. 1970.

A Comprehensive Plant for Lehigh and Northampton Counties, Lehigh-Northampton County Joint Planning Commission, 1964 with up-dates.

Water Supply and Sewage Facilities Plan for Lehigh Valley, Pennsylvania, 1966-2020, Lehigh-Northampton County Joint Planning Commission, 1966, with up-dates.

Regional Recreation and Open Space Plan, Lehigh-Northampton County Joint Planning Commission, 1970.

Outdoor Recreation Horizons, Pennsylvania Statewide Comprehensive Outdoor Recreation Plan (SCORP), Pennsylvania Department of Forests & Waters formerly, now DER), 1970.

A Comprehensive Plan-1990 For Heidelberg, Lowhill, Weisenberg Townships, Heidelberg, Lowhill and Weisenberg Townships Planning Commissions, 1971.

Reading Area Transportation Study Plan, Commonwealth of Pennsylvania Department of Transportation.

K. Coordination with Others (See Appendix 8)

1. USGS A data collection program was initiated in June of 1972. Monthly sampling of five sites of physical (flow), chemical and biological (bacterial) parameters is being accomplished. Sampling is also done periodically during storm events. It is intended to continue this sampling through closure of the dam. (See Appendix 7)

2. EPA Between June and September 1972, a preimpoundment survey was conducted. Physical (flows), chemical and biological data was collected at nine sites and a bioassay performed at each station. The results of this activity have been published by EPA, Region III. It is intended to continue coordination with EPA in future data collection efforts and to actively involve that agency wherever possible. (See Appendix 6) and appendix I.

3. Following are letters received by the District Engineer on the (draft) Supplement Environmental Impact Statement and District responses to the pertinent comments.

UNITED STATES DEPARTMENT OF THE INTERIOR
Office of the Secretary
Washington, D. C. 20240

COMMENT 1

Page a: It is stated that "wildlife displaced by the lake will find new habitat in mitigation lands." This statement is both incorrect and misleading. Lands obtained for mitigation may lessen wildlife loss if niches to support the displaced species are available. However, many of these animals will be lost because of such factors as lack of suitable replacement habitat and inadequate carrying capacity of the mitigation lands.

Page a: We suggest changing the works "North American Flyway" to read "Atlantic Flyway" in the final statement.

RESPONSE

The text has been revised to reflect this.

COMMENT 2

Page 5 and Appendix 3: The reference cited here is now published.

RESPONSE

The text has been revised to reflect this.

COMMENT 3

Page 11, paragraph 3, sentence 3: We suggest changing the word "clearwater" to read "cleanwater" in the final document.

RESPONSE

This word was not found in the cited paragraph.

COMMENT

Page 18, paragraph 2: It is stated that "another DO sag exists at stream mile 2.0 due to the highly organic effluent of Lehigh Valley Cooperative Dairy". The tabulation shown on page 19 indicated that the Lehigh Valley Dairy discharges effluent to Jordan Creek at stream mile 2.0. It is also

implied that the DO measurement was obtained from the dairy's effluent instead of Jordan Creek. The DO concentration increased near the mouth of Jordan Creek at mile 1.8 (6.8 mg/l) when compared with the concentration found below the Trojan Powder Company at mile 5.5 (3.2 mg/l). Thus, we suggest the statement, as we have quoted it, should be deleted.

RESPONSE

The tabulations corroborate previous indications that stream degradation is the result of man-made wastes and identifies certain point sources. Studies are continuing to update the six year old data and to verify location of dairy sample and effects of State water quality regulations on the point sources.

COMMENT 5

Page 37: The statement attributing coliform counts to the U.S. Geological Survey is in error. The coliform counts are not MPN (most probable number). The USGS used the MF (membrane filtration) method of direct counting, in colonies per 100 ml.

RESPONSE

This statement has been corrected.

COMMENT 6

Page 38, paragraph 1: The statement that "a small but significant fishery improvement in resident fish in upstream areas can be expected" conflicts with the last sentence of paragraph 1, page 48. We believe that the resident sport fishery upstream from the lake will not be significant affected by project development.

RESPONSE

This statement has been completed.

COMMENT 7

Page 39, paragraph 1: The second sentence is not clear since it is expected that improved fishing due to the impoundment will result in increased fishing pressure in the area.

RESPONSE

Area capability for fishing as a sport will be enhanced by continuing stocking of the impoundment and by the larger fishing area supporting greater numbers of fishermen that the original stream with limited public access.

COMMENT 8

Page 40, paragraph 1, last sentence: The report of the Bureau of Sport Fisheries and Wildlife, dated February 14, 1973, on the fish and wildlife resources associated with the project recommended that a minimum flow of 13 cfs from Trexler Lake would be necessary in order to prevent downstream fishery losses. We note that a minimum release of only 6 cfs has now been tentatively set. This Department does not concur in the proposed minimum flow release of 6 cfs and wishes to reaffirm its recommendation that this project provide a minimum flow release of 13 cfs. Further, the U.S. Geological Survey has detailed studies of the geology and hydrology of the dry bed section of Jordan Creek underway and any departure from our recommended flow should be deferred until these study results are available.

RESPONSE

Corps responsibility is to maintain average existing downstream flows through the dam. Minimum release of 6 cfs meets that requirement. Additional releases may be available on a seasonal basis and be provided by managerial practices when project purposes are satisfied.

COMMENT 9

Page 46, paragraph 1: The above-referenced report also recommended that 880 acres of land would be required to adequately mitigate wildlife losses. The 339 acre expansion of the Trexler Game Preserve, a county entity, should not be considered as being project related.

RESPONSE

We do not concur. The land adjacent to project lands permits easy wildlife migration into a profected status area where inherent management practices will provide habitat more abundant than presently available on the land which has been used for different purposes. Considering the nature and abundance of wildlife oriented lands in the region and the economic necessity to minimize removal of farm and orchard land from use we see no justification for a one-on-one addition to the project wildlife mitigation average.

COMMENT 10

Page 48, paragraph 1: The Pennsylvania Fish Commission, which will be primarily responsible for managing the fishery, has been contacted and has indicated that they have not considered introducing northern pike, striped bass, or coho salmon into the lake. In addition, the Bureau of Sport Fisheries and Wildlife report, referenced above, stated that the reservoir will not likely provide suitable habitat for salmonids such as coho salmon. Future decision as to the possibility of fish introductions

and species most suited for stocking in the lake will be made by the Pennsylvania Fish Commission. The above information should be reflected in the final document.

RESPONSE

Concur. Historically, the Fish Commission has elected to study an impoundment, prior to implementing any preliminary plan, to be sure conditions are favorable for introduction of selected species.

COMMENT 11

Pages 51-52: In 1963-64, an archeological survey of Trexler Reservoir was contracted to Temple University,but it was not carried out due to the adverse attitude of the local inhabitants. It is felt that this survey should be completed so that a ground search and evaluation of prehistoric and historic sites can be provided. It is stipulated that conservation by relocation of historical values as stated on the basis of presently known sites can be handled by an "authorized Federal source". We suggest that assessment of historical and archeological values is the responsibility of the Corps of Engineers.

RESPONSE

Change made at page 50: Survey was completed in 1965, but not in the depth desired by the author who subsequently indicated the project area contained no significant salvagable archeological artifacts or sites. Historic sites and structures have been identified by State authorities. Compliance with PL-93-291 et al and various Executives Orders directs continuing investigations which will be on-going at the project as lands are acquired.

COMMENT 12

Page 59, paragraph 4: It is stated that "heavy reliance on use of copper sulfate and on other algicides to control algae blooms may not be made in accord with existing State practice with a view towards minimizing temporary deleterious ecological effects." The final document should indicate that any proposed use of an algicide in the lake will be in full accordance with all applicable State and Federal regulations which govern such use.

RESPONSE

Use of copper sulfate and algicides are considered a potential managerial tool should the need arise. Choice between conflicting agency regulations

can only be determined on the basis of specific need at the time of use and criteria selected weighed against both environmental and managerial alternatives.

COMMENT 13

Page 61, paragraph 2: The first sentence fails to mention other adverse effects (such as those upon fishing, boating, or swimming) of drawdown that may be as important as, or even more important than, aesthetic considerations.

RESPONSE

Refer to page 61, para 3 for this info.

COMMENT 14

Page 61, paragraph 2: The second sentence has been taken out of context and does not adequately reflect our appraisal of the project as presented in the above referenced fish and wildlife report. Drawdowns occurring during the spawning period of any species of sport fish could have a severe adverse impact upon the lake fishery resource. The fish and wildlife report indicated that drawdowns, properly timed and under the direction and supervision of the Pennsylvania Fish Commission, could serve as one method of controlling rough fish in the lake. We suggest that the final document reflect the latter statement.

RESPONSE

It is expected that coordination between State and Federal managers will provide compromises in lake management benefiting various uses however, being subsidiary to the major project purposes.

COMMENT 15

Page 61, paragraph 2, sentence 3: The Pennsylvania Fish Commission has been contacted and have indicated that no such studies are in progress. We suggest, therefore, that the statement be deleted from the final document.

RESPONSE

Refer to response to USDI comment number 10.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Box 985, Federal Square Station, Harrisburg, Pa. 17108

May 9, 1974

We have reviewed the Supplement to the Trexler Lake Final Environmental Impact Statement and have no comments to make on its contents.

The field office of the Soil Conservation Service at Allentown, Pa., was recently requested by the Lehigh County Commissioners to expand on the soils information contained in your Environmental Impact Statement. You may obtain the results of the study for the Lehigh County Commission from David C. Tindall, District Conservationist, Soil Conservation Sercice, A-R-F Airport, Reading Aviation Service, Allentown, Pennsylvania 18103.

UNITED STATED DEPARTMENT OF AGRICULTURE
Soil Conservation Service
RAS Aviation Bldg., AVE Airport
Allentown, Penn. 18103

June 18, 1974

A soils map was prepared for the entire "take" area of the Trexler Dam project and colored according to seven land use capability classes. Class I has the least limitations for most uses and limitations increase as the land class number increases. Each land class was measured by planimeter. The total area included was about 4500 acres. The measurements indicated that 0.4% of the area is Class I land, 23% Class II, 22% Class III, 16% Class IV, 15% Class VI, and 23% Class VII. There were no class V or Class VIII soils in the project area.

One of the points of concern to the opposition of the project was the loss of prime agricultural land. The Lehigh County Conservation District considers Class I and Class II soils as prime agricultural land. It is evident by the above statistics that only slightly over 23% of the project falls into this category.

JOINT PLANNING COMMISSION LEHIGH-NORTHAMPTON COUNTIES
Allentown-Bethlehem-Easton Airport
Lehigh Valley, Pennsylvania 18103

May 1, 1974

COMMENT

We understand that adequate information is not available to calculate the effect Trexler Lake's Jordan Creek. We are glad to see that the Corps of engineers have made arrangements to have the U.S. Geological Survey undertake a study to develop suitable data. The Commission agrees that the reservoir should be operated to provide as great an enhancement of downstream flows as is consistent with the water supply function of the project.

RESPONSE

U.S.G.S. Survey is continuing.

COMMENT

On page 39, the supplement indicates that the stream's flood plain as protected by the project will undergo a planned change in land use. As we indicated in our letter of August 2, 1972, concerning the draft EIS, the Commission disagrees with the contention that the dam will allow urbanization of flood plain downstream. We still advocate the acquisition of flood plains and flood plain zoning by municipalities to prevent development of natural floodways. However, protection of existing flood-prone development is a valid goal and benefit of the project.

RESPONSE

A planned change in land use will be the responsibility of local and county government through zoning regulations likely to differentiate from those now existing. Urbanization of the flood plain is not mentioned.

COMMENT

On page 64, the draft suplement indicates that Trexler Dam is a more economical water source for developing portions of Lehigh County than the Lehigh River because of lower treatment, pumping and transmission costs. We feel that the final supplement should contain a detailed reporting of the cost analysis used to make this determination.

RESPONSE

Refer to DRBC letter of 27 September 1973 and CoE letter to Representative Rooney of 16 May 1974, both in Appendix 10.

COMMENT

On page 45, the supplement indicates that a sewerage treatment plant is due to be constructed to serve the Mill Creek-Acres development. The Joint Planning Commission has recommended to the Department of Environmental Resources (DER) that this plant not be granted a permit. A permit application has been denied by DER. This action was upheld by a decision of the Pennsylvania Environmental Hearing Board C & H Development Company v. Pennsylvania Department of Environmental Resources Docket No. 73-299W(1974). This situation is not completely resolved since additional litigation may ensue.

RESPONSE

Commonwealth laws regulating sewage effluent discharge into impoundment waters utilized for water supply are explicit and enforced. No further comment is considered appropriate at this time.

COMMENT

On page 15, the Joint Planning Commission is cited as the source of discharge data for the Jordan Creek. This is an error; the U.S. Geological Survey was probably intended to be used here.

We trust that our comments will be received for their constructive value. There is no intent to change our position in support of the project.

RESPONSE

Sentence has been corrected.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Philadelphia Area Office
Curtis Building, 625 Walnut Street
Philadelphia, Pennsylvania 19106

May 19, 1974

COMMENT

Determined that the proposal was in conformity with local and areawide planning and programming in effect. The proposal will not adversely affect any HUD financed project and the benefits of the combined flood control/recreation project will far outweigh any of the adverse environmental effects of the project. Based upon the above, we recommend approval of this project.

RESPONSE

None required.

TREXLER LAKE SUPP. EIS
COMMENTS: EPA Region III 24 May 1974

COMMENT

The Trexler Lake EIS relates that the minimum release schedule will be determined after the results of the U.S.G.S. Flow study. Unless the Corps has some fiscal or legislative mandate to prepare a final supplement immediately, we request that you delay its preparation until the USGS study is completed and until the Corps takes a final position to which we can respond.

RESPONSE

The responsibility for maintaining average downstream flows is met in the 6CFS minimum release proposed. Possible future adjustment to that proposal resulting from study completion need not be the cause of delaying issuance of the supplement.

NORTHWESTERN LEHIGH
CITIZENS COALITION
Box 36
New Tripoli, Pa. 18066

May 13, 1974

COMMENT

The recently published study by Dr. Wood states that the quality of Jordan Creek water and Lehigh River water is essentially the same and would require the same type of treatment. It further states that ground water supplies are adequate and could be developed further. The study also suggests conservation releases be increased considerably above the planned 6 cfs which was obtained by 'averaging in' a severe drought of prolonged duration.

RESPONSE

That report also qualifies where water can be extracted from the river due to limitations imposed by acid mine drainage. That location coincides with the recuperative area of the river and water withdrawals at that point would degrade the river. Different withdrawal locations are remote from use areas thereby seriously effecting the economics of distribution. Ground water supplies could be further developed but could not alone hope to meet demands. DRBC studies indicate that a combination of sources is the most feasible method of meeting anticipated demand, with Trexler Lake being a major contributor. The 6 cfs release rate considers the project purpose of providing downstream augmentation in time of draught while maintaining at least the normal stream flow of 2 cfs at other times. Managerial prerogatives in normal seasons may permit more than a 6cfs release, however exercise of that capability is contingent on factors only definable at the time.

COMMENT

Conservation releases will decrease the practical potable water yield to approximately 20 mgd. There now exists four deep wells drilled by the Lehigh County Authority in the Fogelsville-Texlertown area which are yielding approximately 5-6 mgd and an engineering study indicates another 5-6 mgd could be obtained from abandoned cement quarries at Fogelsville. The county commissioners and/or authority has acquired this land and could develop this water supply; which, when added to the yield of the existing deep wells will provide approximately half of the practical water supply of the Trexler Dam. A few more deep wells, as suggested by Dr. Wood, could supply the total 20 mgd.

RESPONSE

See previous comment. Development of all the suggested alternatives and possibilities strengthen the continued supply of water. That development is the responsibility of others in an unknown timeframe however, if all development is simultaneous it does not preclude the proposed lake as a prime contributing source in the total supply system.

COMMENT

The draft statement does not include complete copies of all engineering reports and Page 62 leaves the reader with the impression that the dam will provide sufficient water well beyond the year 1990. The complete report from which that information was taken states that by the year 2020 additional water needs will have to be obtained from the Lehigh River, now used by other communities for their water supply. Flows in this river range from 1500 to over 4000 cfs which translates into billions of gallons daily - quantity considerably greater than that to be obtained from the Jordan Creek. Nowhere is there presented a design or cost data for a river intake structure and force mains and/or distribution lines required to utilize this abundanct source of water.

RESPONSE

Water supply is only one of the project purposes. If additional supplies are required 30 years after 1990, the lake contribution will reduce amounts required from other sources and still remain a major system contributor. See previous two comments.

COMMENT

The Impact Statement takes an extremely narrow view of the project and does not indicate the type of secondary development to be induced by this project. This should include the very rural farming area upstream of the dam as well as further urbanization downstream by people who assume they will be protected from floods.

RESPONSE

A section, indicating the relationship of the project to existing land-use plans, has been included to indicate the depth of previous coordination. Secondary development impacts are considered to the extent they are quantifiable and reflect in the presented planning and economic analysis judgements.

COMMENT

Two other omissions from the Impact Statement are the cost of water treatment and distribution systems and the cost of sewage, if required, in the upstream area to reduce or eliminate eutrophication. It will be argued by many that those items are not included in this project, but they should be because they are germaine to it. By including them, the total cost and overall impact can be noted.

RESPONSE

Cost of water treatment and distribution is reflected in consumer charges for that supply. Those initial costs are borne by the prime purchaser - DRBC. Sewage costs are ultimately borne by the user as defined by the local sewer authority. The effect of a regional system on the lake is beneficial. The system is not provided because of the lake but because of the regional requirements.

COMMENT

We do not have any information available on the method of calculating flood control benefits and we assume it is based on the value of buildings 'protected' from flood damage. Unless these calculations have been revised in the last few years they are grossly inaccurate and unrepresentative. Most of the Allentown Area which has been flooded in the past has been cleared for urban renewal and we would expect flood plain zoning theory to gude the reconstruction. When this is taken into account we are sure that the flood control benefits will decrease.

RESPONSE

Benefits are calculated on a basin-wide basis with Allentown being a part. Renewal plans may protect individual structures from floods but not be capable of gross elevation or land use changes sufficient to meet area needs. The value of the benefits from flood control could increase due to higher values of structures in the renewal program.

COMMENT

Recreational possibilities of this project are somewhat confused because of conflicting ideas about the extent of euthrophication, the type of fish that would be available and the quality of water for contact sports.

RESPONSE

Public use plans have been coordinated with appropriate State agencies responsible for their operation and maintenance. It is anticipated that water quality will meet state standards for public swimming. A fishery stocking plan will be initiated after study of lake characteristics by the

Pa. Fish Commission. Alternatives in all managerial plan details are available and the prerogative of State agencies in meeting estimated demands. Since recreational benefits are based on serving an estimated number of users the specific activity is flexible.

COMMENT

Since a clear and definite need for this dam has not been established and because of the current problems of inflation, potential food scarcity, and shortages of petroleum products, it seems unwise to encourage further government spending to remove agricultural land from production while encouraging the frivolous use of gasoline.

RESPONSE

Less than 23% of project lands are presently used for agriculture on a declining scale. The purpose of the reservoir is to address an unmentioned problem of scarcity of water supply. Recreational use of gasoline is subject to the same controls as for any other uses.

COMMENT

We note an increase in visitors from 325,000 per year in the Draft Impact Statement to 425,000 in the Final Impact Statement and its supplement. It is uncertain whether this increase is due to more and better publicity or the need for more visitors to produce a positive cost- benefit ratio. This is nearly twice the population of Lehigh County and will mean an average of more than 1200 people each and every day of the year. Since the visitor load will be concentrated on weekends and holidays during the summer months, we feel the local roads cannot accomodate this amount of traffic and serious problems will result.

RESPONSE

Access to the major day-use area is from Pa. Route 100 which is adequate to accomodate traffic increases. Dispersal of the visitor load throughout other portions of the project provides for only a minimal increase on legislative roads.

COMMENT

The Northwestern Lehigh Citizen's Coalition urges further consideration of the Lehigh River as a source of water and abandonment of flood control and recreation rationalization.

RESPONSE

All alternatives have been explored and additional studies continue. It is becoming clear that in todays economy single purpose water supply sources will not be feasible.

LETTERS RECEIVED BY THE

DISTRICT ENGINEER ON THE

(DRAFT)

SUPPLEMENT

ENVIRONMENTAL IMPACT STATEMENT

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

In reply refer to:
ER-74/486

JUN 13 1974

Dear Mr. Phillips:

This Department has received and reviewed the Supplement to the Trexler Lake Final Environmental Impact Statement. The supplement appears to be more a compilation of several water-quality studies and their results rather than an environmental impact analysis. There are unresolved questions, such as indicated on page 29: "The question as to what effects, if any, the higher than normal coliform and nutrient concentrations will have on water quality after impoundment is the subject of further study in the form of predictive modeling and continued collection and analysis of data." It is further indicated that operation of the impoundment will be done in such a way as to prevent degradation of the downstream environment. Potentials for enhancement, however, are contingent on results of continued U. S. Geological Survey studies.

Thus, we conclude that the full environmental impact, particularly that related to change or improvement of water quality, has not been determined, and apparently is not possible to determine, at this time.

Based on the quality studies reported in the supplement, along with the prudent use of control measures by the Commonwealth to alleviate point sources of pollution discharge to attain established water-quality objectives, it appears that the project purposes of water supply, flood control, and recreation can be achieved. Since it is also reported that tests by the State indicate that there is not much contamination in the upstream Jordan Creek as originally believed (p. 27), we are hopeful that water-contact recreation activities will be possible at this development.

We offer the following further comments and suggest that the modifications indicated below be made to further strengthen the document.

Mr. Worth D. Phillips, Philadelphia, Pennsylvania

Page a: It is stated that "wildlife displaced by the lake will find new habitat in mitigation lands." This statement is both incorrect and misleading. Lands obtained for mitigation may lessen wildlife loss if niches to support the displaced species are available. However, many of these animals will be lost because of such factors as lack of suitable replacement habitat and inadequate carrying capacity of the mitigation lands.

Page a: We suggest changing the words "North American Flyway" to read "Atlantic Flyway" in the final statement.

Page 5 and Appendix 3: The reference cited here is now published.

Page 11, paragraph 3, sentence 3: We suggest changing the word "clearwater" to read "cleanwater" in the final document.

Page 18, paragraph 2: It is stated that "another DO sag exists at stream mile 2.0 due to the highly organic effluent of Lehigh Valley Cooperative Dairy". The tabulation shown on page 19 indicated that the Lehigh Valley Dairy discharges effluent to Jordan Creek at stream mile 2.0. It is also implied that the DO measurement was obtained from the dairy's effluent instead of Jordan Creek. The DO concentration increased near the mouth of Jordan Creek at mile 1.8 (6.8 mg/1) when compared with the concentration found below the Trojan Powder Company at mile 5.5 (3.2 mg/1). Thus, we suggest the statement, as we have quoted it, should be deleted.

Page 27: The statement attributing coliform counts to the U. S. Geological Survey is in error. The coliform counts are not MPN (most probable number). The USGS used the MF (membrane filtration) method of direct counting, in colonies per 100 ml.

Page 38, paragraph 1: The statement that "a small but significant fishery improvement in resident fish in upstream areas can be expected" conflicts with the last sentence of paragraph 1, page 48. We believe that the resident sport fishery upstream from the lake will not be significantly affected by project development.

Mr. Worth D. Phillips, Philadelphia, Pennsylvania

Page 39, paragraph 1: The second sentence is not clear since it is expected that improved fishing due to the impoundment will result in increased fishing pressure in the area.

Page 40, paragraph 2, last sentence: The report of the Bureau of Sport Fisheries and Wildlife, dated February 14, 1973, on the fish and wildlife resources associated with the project recommended that a minimum flow of 13 cfs from Trexler Lake would be necessary in order to prevent downstream fishery losses. We note that a minimum release of only 6 cfs has now been tentatively set. This Department does not concur in the proposed minimum flow release of 6 cfs and wishes to reaffirm its recommendation that this project provide a minimum flow release of 13 cfs. Further, the U. S. Geological Survey has detailed studies of the geology and hydrology of the dry bed section of Jordan Creek underway and any departure from our recommended flow should be deferred until these study results are available.

Page 46, paragraph 1: The above-referenced report also recommended that 880 acres of land would be required to adequately mitigate wildlife losses. The 339-acre expansion of the Trexler Game Preserve, a county entity, should not be considered as being project related.

Page 48, paragraph 1: The Pennsylvania Fish Commission, which will be primarily responsible for managing the fishery, has been contacted and has indicated that they have not considered introducing northern pike, striped bass, or coho salmon into the lake. In addition, the Bureau of Sport Fisheries and Wildlife report, referenced above, stated that the reservoir will not likely provide suitable habitat for salmonids such as coho salmon. Future decision as to the possibility of fish introductions and species most suited for stocking in the lake will be made by the Pennsylvania Fish Commission. The above information should be reflected in the final document.

Mr. Worth D. Phillips, Philadelphia, Pennsylvania

Pages 51-52: In 1963-64, an archeological survey of Trexler Reservoir was contracted to Temple University, but it was not carried out due to the adverse attitude of the local inhabitants. It is felt that this survey should be completed so that a ground search and evaluation of prehistoric and historic sites can be provided. It is stipulated that conservation by relocation of historical values as stated on the basis of presently known sites can be handled by an "authorized Federal source." We suggest that assessment of historical and archeological values is the responsibility of the Corps of Engineers.

Page 59, paragraph 4: It is stated that "heavy reliance on use of copper sulfate and on other algicides to control algae blooms may not be made in accord with existing State practice with a view towards minimizing temporary deleterious ecological effects." The final document should indicate that any proposed use of an algicide in the lake will be in full accordance with all applicable State and Federal regulations which govern such use.

Page 61, paragraph 2: The first sentence fails to mention other adverse effects (such as those upon fishing, boating, or swimming) of drawdown that may be as important as, or even more important than, aesthetic considerations.

Page 61, paragraph 2: The second sentence has been taken out of context and does not adequately reflect our appraisal of the project as presented in the above-referenced fish and wildlife report. Drawdowns occurring during the spawning period of any species of sport fish could have a severe adverse impact upon the lake fishery resource. The fish and wildlife report indicated that drawdowns, properly timed and under the direction and supervision of the Pennsylvania Fish Commission, could serve as one method of controlling rough fish in the lake. We suggest that the final document reflect the latter statement.

Mr. Worth D. Phillips, Philadelphia, Pennsylvania

Page 61, paragraph 2, sentence 3: The Pennsylvania Fish Commission has been contacted and have indicated that no such studies are in progress. We suggest, therefore, that the statement be deleted from the final document.

We thank you for the opportunity to review and comment on the subject document.

Sincerely yours,

Deputy Assistant Secretary of the Interior

Mr. Worth D. Phillips
Chief, Engineering Division
Department of the Army
Philadelphia District, Corps of Engineers
Custom House--2nd and Chestnut Streets
Philadelphia, Pennsylvania 19106

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Box 985, Federal Square Station, Harrisburg, Pennsylvania 17108

May 9, 1974

Mr. Worth D. Phillips
Chief, Engineering Division
Philadelphia District
U. S. Army Corps of Engineers
Custom House, 2d & Chestnut Streets
Philadelphia, Pennsylvania 19106

Dear Mr. Phillips:

We have reviewed the Supplement to the Trexler Lake Final Environmental Impact Statement and have no comments to make on its contents.

The field office of the Soil Conservation Service at Allentown, Pennsylvania, was recently requested by the Lehigh County Commissioners to expand on the soils information contained in your Environmental Impact Statement. You may obtain the results of the study for the Lehigh County Commission from David C. Tindall, District Conservationist, Soil Conservation Service, A-B-E Airport, Reading Aviation Service, Allentown, Pennsylvania 18103.

We appreciated the opportunity to review and comment on this proposed project.

Sincerely,

Benny Martin
State Conservationist

cc: Mr. Kenneth E. Grant, Administrator, SCS, Washington, D. C.
Mr. Robert E. Kohnke, Director, River Basins Division, SCS, Washington, D. C.
Dr. Fred Tschirley, Coordinator of Environmental Quality Activities, USDA Office of the Secretary, Washington, D. C. 20250
Council of Environmental Quality, 1722 Jackson Place, Washington, D.C. 20006

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
RAS Aviation Bldg., ABE Airport
Allentown, Penna. 18103

June 18, 1974

Mr. Worth D. Phillips
Chief, Engineering Division
Department of Army
Philadelphia District, Corps of Engineers
Custom House-2nd & Chestnut Streets
Philadelphia, Pennsylvania 19106

RE: NAPEN-E

Dear Mr. Phillips:

Regarding your letter requesting the additional soils information which was provided to the Lehigh County Commissioners, the following report was prepared.

A soils map was prepared for the entire "take" area of the Trexler Dam project and colored according to seven land use capability classes. Class I has the least limitations for most uses and limitations increase as the land class number increases. Each land class was measured by planimeter. The total area included was about 4500 acres. The measurements indicated that 0.4% of the area is Class I land, 23% Class II, 22% Class III, 16% Class IV, 15% Class VI, and 23% Class VII. There were no Class V or Class VIII soils in the project area.

One of the points of concern to the opposition of the project was the loss of prime agricultural land. The Lehigh County Conservation District considers Class I and Class II soils as prime agricultural land. It is evident by the above statistics that only slightly over 23% of the project falls into this category.

I hope you will find this information helpful. If you have need for the soils map which was prepared, let me know and we will prepare an additional copy as time and workload allows.

Sincerely,

David C. Tindall
District Conservationist

DCT:df

JOINT PLANNING COMMISSION LEHIGH-NORTHAMPTON COUNTIES

ALLENTOWN-BETHLEHEM-EASTON AIRPORT
LEHIGH VALLEY, PENNSYLVANIA 18103

May 1, 1974

CODE TELEPHONE
215 264-4544

MICHAEL N. KAISER
Executive Director
MORRIS MINDLIN
Solicitor

Mr. Worth D. Phillips
Chief, Engineering Division
Department of the Army
Philadelphia District, Corps of Engineers
Custom House, 2nd & Chestnut Streets
Philadelphia, PA 19106

RE: Draft Supplement to the Trexler Lake
Environmental Impact Statement
NAPEN-E

Dear Mr. Phillips:

The Joint Planning Commission reviewed the above-referenced statement pursuant to the requirements of section 102(2)(c) of the National Environmental Policy Act of 1969. We offer the following comments:

We understand that adequate information is not available to calculate the effect Trexler Lake's operation will have on downstream flows in the Jordan Creek. We are glad to see that the Corps of Engineers have made arrangements to have the U.S. Geological Survey undertake a study to develop suitable data. The Commission agrees that the reservoir should be operated to provide as great an enhancement of downstream flows as is consistent with the water supply function of the project.

On page 39, the supplement indicates that the stream's flood plain as protected by the project will undergo a planned change in land use. As we indicated in our letter of August 2, 1972, concerning the draft EIS, the Commission disagrees with the contention that the dam will allow urbanization of the flood plain downstream. We still

advocate the acquisition of flood plains and flood plain zoning by municipalities to prevent development of natural floodways. However, protection of existing flood-prone development is a valid goal and benefit of the project.

On page 64, the draft supplement indicates that Trexler Dam is a more economical water source for developing portions of Lehigh County than the Lehigh River because of lower treatment, pumping and transmission costs. We feel that the final supplement should contain a detailed reporting of the cost analysis used to make this determination.

We offer the following comments merely as clarifications to your text.

On page 45, the supplement indicates that a sewerage treatment plant is due to be constructed to serve the Mill Creek Acres development. The Joint Planning Commission has recommended to the Department of Environmental Resources (DER) that this plant not be granted a permit. A permit application has been denied by DER. This action was upheld by a decision of the Pennsylvania Environmental Hearing Board C & H Development Company v. Pennsylvania Department of Environmental Resources Docket No. 73-299W(1974). This situation is not completely resolved since additional litigation may ensue.

On page 15, the Joint Planning Commission is cited as the source of discharge data for the Jordan Creek. This is an error; the U.S. Geological Survey was probably intended to be used here.

We trust that our comments will be received for their constructive value. There is no intent to change our position in support of the project.

Very truly yours,

Allen R. O'Dell

Allen R. O'Dell
Senior Planner

ARO:sb

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
PHILADELPHIA AREA OFFICE
CURTIS BUILDING, 625 WALNUT STREET
PHILADELPHIA, PENNSYLVANIA 19106

REGION III
Curtis Building
6th. and Walnut Streets
Philadelphia, Pennsylvania 19106

MAY 17 1974

IN REPLY REFER TO:
3.4PPC
Your Ref:
NAPEN-E

Dr. John A. Burnes
Chief, Environmental Resources Branch
Department of the Army
Philadelphia District, Corps of Engineers
Custom House- 2nd & Chestnut Streets
Philadelphia, Pennsylvania 19106

Dear Mr. Burnes:

Subject: Trexler Lake Project, Lowhill Township, Lehigh County
Final Environmental Impact Statement

Thank you for the opportunity to review the Final Environmental Impact Statement Supplement for the Trexler Lake Project. As a result of our review, we are able to reaffirm findings expressed in our letter of August 14, 1972. Specifically, we determined that the proposal was in conformity with local and areawide planning and programming in effect. The proposal will not adversely affect any HUD financed project and the benefits of the combined flood control/recreation project will far outweigh any of the adverse environmental effects of the project. Based upon the above, we recommend approval of this project.

Sincerely,

James R. Treadwell

James R. Treadwell, Jr.
Environmental Clearance Officer

cc:
G T. Atkeson/General Counsel, CEQ, Wash., D.C. (10 cys)
M Assistant Sec'y for CP&D, Attn: Env. Clearance Officer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

May 24, 1974

Mr. Worth D. Phillips
Chief, Engineering Division
Philadelphia District, Corps of Engineers
U.S. Customs House
2nd and Chestnut Streets
Philadelphia, Pennsylvania 19106 Attn: NAPEN-E

Dear Mr. Phillips:

We have reviewed the Draft Supplement to the Final Environmental Impact Statement for Trexler Lake, Jordan Creek, Pennsylvania. We do not feel that this supplement has resolved our reservations on the Trexler Lake Final EIS. The statement relates that the minimum release schedule will be determined after the results of the USGS flow study. This study is not available and in our letter of October 19, 1973 we said we would reserve final comment until we have the opportunity to review the USGS report. We were under the impression that the supplement would not be prepared until the USGS data was available.

Unless the Corps has some fiscal or legislative mandate to prepare a final supplement immediately, we request that you delay its preparation until the USGS study is completed and until the Corps takes a final position to which we can respond.

Sincerely yours,

Nicholas M. Ruha
Chief,
EIS and Wetlands Review Section
Environmental Impact Branch

CITIZENS COALITION
Box 36
New Tripoli, PA 18066

May 13, 1974

Mr. Worth D. Phillips
Chief, Engineering Division
Department of the Army
Philadelphia District, Corps of Engineers
Custom House - 2D & Chestnut Streets
Philadelphia, Pennsylvania 19106

Dear Mr. Phillips:

We have reviewed the Trexler Lake Draft Supplement to the Final Impact Statement issued April 2, 1974 and find that our previous questions and objections remain unsatisfied.

Since water supply is to provide approximately 60% of the claimed benefits, this area should be examined very carefully.

The recently published study by Dr. Wood states that the quality of Jordan Creek water and Lehigh River water is essentially the same and would require the same type of treatment. It further states that ground water supplies are adequate and could be developed further. The study also suggests conservation releases be increased considerably above the planned 6 cfs which was obtained by 'averaging in' a severe drought of prolonged duration.

Conservation releases will decrease the practical potable water yield to approximately 20 mgd. There now exists four deep wells drilled by the Lehigh County Authority in the Fogelsville-Trexlertown area which are yielding approximately 5-6 mgd and an engineering study indicates another 4-6 mgd could be obtained from abandoned cement quarries at Fogelsville. The county commissioners and/or authority has acquired this land and could develop this water supply; which, when added to the yield of the existing deep wells will provide approximately half of the practical water supply of the Trexler Dam. A few more deep wells, as suggested by Dr. Wood, could supply the total 20 mgd.

The draft statement does not include complete copies of all engineering reports and Page 62 leaves the reader with the impression that the dam will provide sufficient water well beyond the year 1990. The complete report from which that information was taken states that by the year 2020 additonal water needs will have to be obtained from the Lehigh River, now used by other communities for their water supply. Flows in this river range from 1500 to over 4000 cfs which translates into billions of gallons daily - quantity considerably greater than that to be obtained from the Jordan Creek. Nowhere is there presented a design or cost data for a river intake structure and force mains and/or distribution lines required to utilize this abundanct source of water.

The Impact Stateement takes an extremely narrow view of the project and does not indicate the type of secondary development to be induced by this project. This should include the very rural farming area upstream of the dam as well as further urbanization downstream by people who assume they will be protected from floods.

Two other omissions from the Impact Statement are the cost of water treatment and distribution systems and the cost of sewage, if required, in the upstream area to reduce or eliminate eutrophication. It will be argued by many that those items are not included in this project, but they should be because they are germaine to it. By including them, the total cost and overall impact can be noted.

We do not have any information available on the method of calculating flood control benefits and we assume it is based on the value of building 'protected' from flood damage. Unless these calculations have been revised in the last few years they are grossly inaccurate and unrepresentative. Most of the Allentown area which has been flooded in the past has been cleared for urban renewal and we would expect flood plain zoning theory to guide the reconstruction. When this is taken into account we are sure that the flood control benefits will decrease.

Recreational possibilities of this project are somewhat confused because of conflicting ideas about the extent of eutrophication, the type of fish that would be available and the quality of water for contact sports.

We note an increase in visitors from 325,000 per year in the Draft Impact Statement to 425,000 in the Final Impact Statement and its supplement. It is uncertain whether this increase is due to more and better publicity or the need for more visitors to produce a positive cost-benefit ratio. This is nearly twice the population of Lehigh County and will mean an average of more than 1200 people each and every day of the year. Since the visitor load will be concentrated on weekends and holidays during the summer months, we feel the local roads cannot accomodate this amount of traffic and serious problems will result.

Since a clear and definite need for this dam has not been established and because of the current problems of inflation, potential food scarcity, and shortages of petroleum products, it seems unwise to encourage further government spending to remove agricultural land from production while encouraging the frivolous use of gasoline.

The Northwestern Lehigh Citizens' Coalition urges further consideration of the Lehigh River as a source of water and abandonment of flood control and recreation rationalization.

Sincerely yours,

J. Bruce Mordaunt

J. Bruce Mordaunt
President

Copies to: CEQ (John Busterud)
EPA (R.E. Train)
EPA (R.J. Blanco)
Rep. Fred B. Rooney

EPA CORRESPONDENCE, 5 MAY 1975
APPROVAL OF 6 CFS RELEASE

APPENDIX 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

May 5, 1975

Mr. Gordon Dilley
Assistant Chief Planning Division
Philadelphia District
U.S. Army Corps of Engineers
Customs House
2nd and Chestnut Streets
Philadelphia, Pennsylvania 19106

Dear Mr. Dilley:

As a result of our April 14, 1975 meeting, I agreed to formally follow up so that our present position on the Trexler Lake proposal would be clear both to the Philadelphia District and the North Atlantic Division, Corps of Engineers, particularly since a year has elapsed since our last formal correspondence. This then represents an opportunity for us to convey our evaluations regarding the adequacy of new data in terms of responding to questions we raised in earlier reviews of the project.

EPA's April 18, 1974 comments on the EIS Supplement stated that we felt it was necessary to delay full NEPA approval until the USGS study had been completed. Since then we have received preliminary information and data prepared by USGS and submitted to us through the Corps concerning a study of surface water losses and gains in Jordan Creek under conditions without the reservoir in operation.

Our main concern has been the impact of Trexler Lake on surface water resources downstream from the dam, particularly in view of the existing phenomenon of water losses in the stream reaches underlain with carbonate rocks. The recent USGS data consists of the results of detailed surface water gaging along Jordan Creek on five days representing three low flow periods and two spring flows. Their data and preliminary analysis of it shows that there is definitely a water losing reach in Jordan Creek downstream from the proposed dam but the losses are usually gained back as return spring flows near the mouth. However, there appears to be a net loss of surface flows from Jordan Creek since the surface flows per unit drainage

[illegible] decrease significantly in the downstream direction. The data also shows that the flow at the mouth of Jordan Creek equals or exceeds the flow at a point upstream from the water losing area at least 85% of the time.

The recent USGS data plus a reanalysis of past USGS records of surface flows on Jordan Creek has shed more light on our previously stated concerns of the proposed minimum release schedule for Trexler Lake. Past records show that flows in Jordan Creek have been as low as 0.4 cfs at Schnecksville, Pennsylvania and zero flows have been recorded near the mouth. A flow duration analysis demonstrates that at the mouth of Jordan Creek 4.9 cfs is equalled or exceeded 85% of the time. Based on the past records of surface streamflows, we feel that the proposed minimum release of 6 cfs would not adversely affect surface flows during low flow periods, and that this schedule would simulate natural conditions. However, we do request to be advised of subsequent information evolving from the USGS work that will have bearing on the 6 cfs minimum release schedule.

As also discussed at that meeting we are presently studying the [illegible] and secondary environmental effects of funding municipal wastewater treatment facilities in the Allentown area through Title II of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). In conjunction with these investigations, we are evaluating the question of water supply availability to serve a future population commensurate with sewage treatment capacity EPA might be providing. In this sense the Trexler Lake Project relates to EPA's future programs, since a major purpose of the Lake is to supply water for municipal and industrial needs beyond the Jordan Creek Basin. Our concern relates to the overall reduction of the water-table in the lower Jordan Creek basin that might occur as a result of the flow regime once the Trexler Lake Project is in operation. This concern has come to our immediate attention as a result of our own recent work and discussions with local interests, although we were aware of the potential problem during our earlier review of the EIS and raised this issue on page 6 of our July 5, 1972 comments on the Draft EIS.

As much as 36 mgd has been contracted for future use by DRBC who in turn will sell the water to local users. This projected diversion from the reservoir is approximately 60% of the average annual flow of Jordan Creek upstream from the water losing reach. Since the surface losses reappear as spring flows in lower Jordan Creek and ultimately as spring flows in the lower Lehigh River and since there is a definite relationship between surface flows and groundwater levels in the lower Jordan Creek Basin, there could be a significant impact of the diversion on groundwater. Based on the information available to this Agency, it appears that the magnitude of the impact and the effect on groundwater needs in the lower Jordan Creek and Lehigh

River areas is presently unknown and not fully addressed in the Trexler Lake EIS. Since the recently acquired USGS data did not address groundwater, we encourage USGS and the Corps to pursue further studies that will hopefully adequately respond to EPA's earlier comments relating to downstream effects of the proposed reservoir. During our discussion on April 14 we were informed that the current USGS studies include monitoring of groundwater levels which should provide the basic data for use in predicting the effects on groundwater of a substantially reduced flow.

In summary, we believe that the interbasin transfer of water as it affects groundwater resources of the Jordan Creek Basin should be studied and resolved at the earliest time possible in light of the significance of the water supply feature of Trexler Lake. With regard to the minimum release schedule, the preliminary USGS information and other records have enabled us to conclude that 6 cfs appears adequate to maintain surface flows during low flow periods.

Should you desire further discussion, we would be willing to meet with you again.

Sincerely yours,

Robert J. Blanco, P.E.
Chief
Environmental Impact Branch

PENNSYLVANIA FISH COMMISSION

PROPOSED PROGRAM

APPENDIX II

FISHERIES MANAGEMENT PLAN
PENNSYLVANIA FISH COMMISSION

Trexler Lake, Lehigh County

I. WATER QUALITY

Jordan Creek arises as a freestone stream on the southern slope of Blue Mountain. As it flows, it comes in contact with underlying carbonate rocks which change its water quality. Parameters such as pH, total alkalinity, and total hardness become elevated. In terms of aquatic life and the fishery, this condition is favorable in supporting an increased biomass and, consequently, a better fishery than a freestone situation.

There is evidence of some enrichment from agricultural activities and possibly ineffective onlot sewage disposal systems upstream from the proposed impoundment. However, significant effects of this enrichment on the present fisheries have not been noted by Commission personnel.

A. Effects Upon Fish in the Impoundment

Depending upon the water withdrawal patterns in the impoundment, effects of existing upstream pollution directly upon the fishery should not be a significant problem, except as it may influence aquatic vegetation growth.

B. Effects Upon Aquatic Plants in the Impoundment

There exists the potential for proliferation of aquatic vegetation in the impoundment, especially directly after filling. The various conservation and regulatory agencies controlling potential nutrient materials should be fully aware of this possibility.

II. FISHES AND THE FISHERY

A. Species of Fish Collected From Jordan Creek in the Area of the Impoundment

Common Name	Species
Brown trout	S. trutta
Rainbow trout	S. gairdneri
Smallmouth bass	M. dolomieui
Largemouth bass	M. salmoides
Bluegill	L. macrochirus
Redbreast sunfish	L. auritus
Pumpkinseed	L. gibbosus
Rockbass	A. rupestris
Brown bullhead	I. nebulosus
Redfin pickerel	E. americanus americanus
American eel	A. rostrata
Carp	C. carpio
White sucker	C. commersoni

Common Name	Species
Fallfish	S. corporalis
Creek shub	S. atromaculatus
Shield darter	P. peltata
Johnny darter	E. nigrum
Tesselated darter	E. olmstedi
Common shiner	N. cornutus
Spottail shiner	N. hudsonius
Spotfin shiner	N. spilopterus
Comely shiner	N. amoenus
Swallowtail shiner	N. procne
Blacknose dace	R. atratulus
Longnose dace	R. cataractae
Bluntnose minnow	P. notatus
Banded killifish	F. diaphanus
Margined madtom	N. insignis

As can be noted from this listing, there is a wide diversity of fishes present in Jordan Creek in the area of the impoundment. It is possible that anadromous fishes such as several clupeids would periodically be present in the lower Jordan Creek if their passage was not blocked by dams on the Lehigh River.

Of the twenty-eight species mentioned, far less than half would be expected to contribute to the fishery, either directly or indirectly, in the impoundment.

B. Warmwater Gamefishes to be Managed in the Lake

1. Tiger Muskellunge

This northern pike x muskellunge hybrid will be planted in the lake initially as fry. The reason for its selection is due to its fast growth, its fine sporting qualities, and, like the northern pike, it is easier to catch than the muskellunge. This hybrid is sterile and its numbers will therefore be maintained following the initial fry introductions by periodic fingerling plantings.

2. Walleye

Walleye will be stocked initially as fry. Since natural reproduction and recruitment of this species is adequate where conditions in a new impoundment are favorable, future introductions beyond the first two years should not be necessary.

3. Largemouth bass

This species, which is already present at the site, will be introduced as fry. Due to its ability to grow fast and rapidly expand its numbers in a new lake, no introductions beyond the first two years are anticipated.

4. Black Crappie

Black crappie fingerlings will be introduced the first year and, because of their ability to rapidly proliforate, subsequent stockings will not be necessary. This fish has gained tremendously in popularity in recent years in Pennsylvania and is expected to produce a very desirable fishery, especially in early spring.

5. [illegible] Catfish

[illegible] of this species will be stocked late the first year. Some natural reproduction and recruitment is anticipated, but periodic plantings can be made as management surveys indicate are necessary.

C. Coldwater Fisheries

1. In the Lake

There exists a remote possibility that because of the significant depth of the lake, a two-story fishery may become a reality. If after proper investigation by the Fisheries Management Section staff a possibility of [illegible] exists, recommendations will be made for the introduction of fingerlings only of brown and/or rainbow trout. Adult trout will not be stocked.

2. Tailwaters

[illegible] with respect to a possible tailwater trout fishery is somewhat unclear at this time because the pattern of water release and the [illegible] the downstream area of Jordan Creek are not presently clear to the Commission. If sufficient cold water is released to allow the stream to maintain a sufficient flow of water which will hold coldwater fishes in Jordan Creek downstream from the lake, this segment of stream will be managed for coldwater species. This would be very desirable, not only because of the areas' need for additional coldwater fisheries, but it will also mitigate the loss of the present stocking area which will be impounded.

III. BASIN [illegible]

A. [illegible] Clearing

[illegible] understand that the lake will have many uses, including water supply, and that only those materials which would cause problems in a water supply or which would interfere with the actual operation of the lake [illegible] should be removed. From a fisheries standpoint, all brush, trees, [illegible] should be left intact, where possible, in order to provide cover for fish.

B. Cover Habitat Improvement

The extent to which reservoir clearing is implemented will determine the necessity for artificial cover habitat improvement. It is much more feasible to retain natural cover than to expend time, money, and eventual maintenance costs to establish artificial cover. Specific needs for habitat improvement will not be known until the extent of reservoir clearing is determined.

C. Spawning Habitat Improvement

The necessity for this type of improvement will also depend upon the extent to which reservoir clearing and grubbing is carried out. The nature and availability of the shoreline material in terms of gravel and other suitable spawning substrate material has not been made clear in the Environmental Impact Statement. If few shallow shoal areas containing the necessary spawning substrate are anticipated, then artificial spawning areas should be included in the final plans for the lake.

IV. DRAWDOWN

A. Effects on the Fishery

Water level fluctuations in Trexler Lake will, as we understand the situation, become necessary mainly because of the minimum daily release requirement of 5 C.F.S. throughout the year. This type of drawdown should not affect the fishery adversely for two reasons. 1) It will not be a sudden withdrawal. 2) The impact will be felt primarily in mid- to late summer, following the spawning activity of the most important gamefishes.

The fry and fingerlings of the gamefishes will be made more susceptible to predation because of the drawdown; however, the fry and fingerlings of both panfish and forage fish will also become more exposed to predation. Since the young of panfish and forage fish will far outnumber game fishes, more of them should be consumed, thereby making a better population balance.

B. Effects on the Aquatic Vegetation

Should the impounded water be subject to aquatic vegetation proliferation, it would probably be in the form of plankton rather than rooted aquatics. Rooted aquatics theoretically should have difficulty in becoming established if water fluctuations as outlined become a reality. If any form of aquatic vegetation does become a problem, periodic intentional fall and winter drawdowns exceeding the proposed yearly average drawdown should be considered for keeping aquatic vegetation under control.

V. ACCESSIBILITY

A. Shoreline

Shoreline accessibility is of the utmost importance, particularly to those who do not own boats, and also to the disabled and handicapped. It is assumed that maximum consideration will be given to the development of launching ramps,

boat liveries, and parking facilities. We would highly recommend the planning of fishermen access trails so that unnecessary harm is not done to the natural vegetation and other desirable characteristics of the shoreline.

B. Fishing Piers

Consideration should be given to the construction of fishing piers which could be very beneficial to non-boat fishermen and especially to handicapped persons. Various designs for such facilities can be employed.

VI. COMMERCIAL FISHING

No commercial fishing is anticipated in or around this facility.

VII. FISHERIES MANAGEMENT ACTIVITIES

All of the fisheries management activities associated with Trexler Lake will be correlated through the Area Fisheries Manager's office at Nockamixon State Park, Bucks County. He and his staff will be conducting periodic surveys involving all aspects of the fishery.

The Area Fisheries Manager concept is a relatively new one, and we are very optimistic that our fisheries management plans and the subsequent local coordination between Corps personnel and our Area Fisheries Manager will result in a well-coordinated operation which will better serve the public and the fishermen of the area.

It should be noted here that the Final Environmental Impact Statement, dated 1973, does not reflect the Commission's input. Statements to the effect that we will stock muskellunge, chain pickerel, coho salmon, striped bass, northern pike, and alewife did not originate with this agency. We also do not subscribe to such proposals as a seining area for "rough" fish or a drawdown for rough fish control. Such concepts are felt to be unrealistic and if not contained in this plan, do not represent Commission recommendations.